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Integration of Social Sciences in Terrorism Modelling: Issues, Problems and Recommendations

L. Resnyansky

**Command and Control Division
Defence Science and Technology Organisation**

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ABSTRACT

This report identifies and discusses issues and problems related to the integration of social scientific knowledge in terrorism modelling. It analyses the state of the art in the area of modelling the origins and causes of terrorism and other forms of political violence; terrorists' behaviour; the structure of terrorist organisations and networks; terrorism threat; and influence strategies and actions directed towards terrorism threat anticipation and minimisation.

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Executive Summary

There is a growing understanding among decision makers and the modelling community that the development of models supporting terrorism analysis needs to be informed by social sciences. However, an integration of social sciences into modelling is a complex task and there are no ready procedures and recommendations on how to use the social scientific knowledge in terrorism modelling.

This report identifies and discusses the modellers' ideas regarding the kind of knowledge they may need from social science. The focus is on such issues as terrorism origins and causes; terrorism threat typology; quantification of human perception of terrorism threat; the different scales problem; and the use of empirical and culturally specific data. Analysis of social studies of terrorism suggests that the integration of social science in modelling is difficult due to the specific nature of the object of social research (it is meaningful, socially constructed, culturally specific, and changing); the complexity of primary data and indicators; and the necessity to draw upon qualitative and interpretative research conducted within different disciplines (political science, history, sociology, cultural studies, and so on).

It is suggested that integration of social scientific knowledge into the modelling requires intermediate conceptual frameworks that could govern the choice and use of social scientific findings according to the needs and goals of modellers and the models' end user (analyst, decision maker). The intermediate frameworks can be based on the general social theoretical concepts of structure, system, activity, and interaction. The report identifies social disciplines, theories and approaches that can inform the integrative frameworks and provide specific (middle range) theories and qualitative and quantitative data.

The report highlights the importance of the critical assessment of models and modelling tools in terms of their potential impact upon users' work practices and in terms of their broader strategic and social implications. It is argued that terrorism models and modelling tools must be evaluated both in terms of their heuristic significance and in terms of their utility. Understanding a model's heuristic significance and limitations requires an explication and critical analysis of the key concepts and theories in which the model is grounded. In order to assess the model's potential impact upon practices and strategic purposes of counter-terrorism and terrorism threat anticipation/reduction, it is necessary to clearly identify the aspects of terrorism (causes of origin, social basis, terrorist organisation, activity, or terrorism effects) that are modelled and reveal the model's sociocultural and disciplinary specificity.

Authors

L. Resnyansky

Command and Control Division

Dr Lucy Resnyansky - Research Scientist, Command & Control Division, Defence Science and Technology Organisation (DSTO) has a graduate degree in Linguistics (1985) and a PhD in Social Philosophy (1994) from Novosibirsk State University (Russia); and a PhD in Education (2005) from University of South Australia. She was affiliated with the University of Wollongong, Macquarie University, and the University of Western Sydney. Her research experience covers sociological studies of attitudes, beliefs and motivation; theoretical modelling and empirical studies of human communication; analysis of media and advertising; and technology and society studies. Her research interests are in such areas as social semiotics, sociology of science, social informatics, and sociocultural theories of cognitive action, learning and meaning.

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Acronyms

ANL	Argonne National Laboratory
ASCO	Advanced Systems Concepts Office
DTRA	Defense Threat Reduction Agency
JTAC	Joint Threat Anticipation Center
R&D	Research and Development

Glossary

Action

1. any unit or sequence of social activity or behaviour, e.g. the action of a trade union or state, as well as the action of an individual.
2. (in contrast with behaviour) any unit of sequence of individual social activity which is intentional or purposive and involves conscious deliberation rather than merely being the result of a biological reflex. For Weber, meaningful social action consists of any course of action in which subjective meaning guides the action and where this action is oriented towards others. (Jary and Jary 2000, p. 4)

Agency

1. the power of actors to operate independently of the determining constraints of social structure. The term is intended to convey the volitional, purposive nature of human activity as opposed to its constrained, determined aspects. Although utilised in widely different ways, it is especially central in methodological individualism, ethnomethodology, phenomenology and symbolic interactionism ...
2. any human action, collective or structural *as well as* individual, which 'makes a difference' to a social outcome; thus, for Giddens (1984), agency is equivalent to power. In this way, Giddens opposes any simple polarisation of 'structure' and 'agency'. This is related to his view that structure must be seen as 'enabling' as well as 'constraining'. (Jary and Jary 2000, p. 10)

Behaviour

1. the alteration, movement or response of any entity, person or system acting within a particular context.
2. (Psychology) the externally observable response of an animal or human organism to an environmental stimulus ... An important distinction is often made in sociology between automatic forms of behaviour ... e.g. jumping up after sitting on a drawing pin, and intended action, where social meanings and purposes are also involved. (Jary and Jary 2000, pp. 37-38)

Epistemology

(From the Greek *episteme*, knowledge.) The branch of philosophy concerned with the theory (or theories) of knowledge, which seeks to inform us how we can know the world ... In most forms of epistemology, the pure thought of the individual thinking 'ego', the philosopher, has been taken as providing the route to the ultimate understanding of knowledge and the bedrock on which the epistemological theory advanced is based ... Recently, however, more sociological forms of epistemology have emerged which have sought to 'decentre' the role played by the traditional individual 'subject' in philosophy ... emphasising instead the way in which knowledge is shaped by social structure, forms of life, etc. Thus, the way is now open for much of the

ground previously occupied by philosophy to be taken over by sociological accounts of knowledge and of science ... Once knowledge, including scientific knowledge, is seen clearly as a socially-constructed phenomenon, the expectations of any final doctrines about the nature of knowledge can be seen as misplaced. (Jary and Jary 2000, pp. 186-187)

Formal and Substantive Rationality

The distinction between the formal rationality of, say, economic action, as the 'quantitative calculation or accounting that is technically possible and is actually applied', and substantive rationality, which refers to rational social action that occurs 'under some criterion (past, present or potential) of ultimate value' ... Weber ... regarded the latter as so 'full of ambiguities' as to render any possibility of its systematisation out of the question, since it involves 'an infinite number of possible value scales'. (Jary and Jary 2000, p. 222)

Mechanical and Organic Solidarity

The distinction drawn by Emile Durkheim ... between two types of social solidarity: mechanical solidarity, based on the similarity between individuals, the form of solidarity predominant in simple and less-advanced societies, and organic solidarity, based on the division of labour and complementarities between individuals, the form of solidarity ideally occurring in modern advanced societies. Durkheim formulated the distinction between the two types of solidarity by identifying the demographic and morphological features basic to each type, the typical forms of law and formal features and content of the conscience collective, which ought to be associated with each type. (Jary and Jary 2000, p. 377)

Rational Choice Theory

A relatively formal approach to sociological and social science theorising, e.g. drawing upon the theory of games notion of strategic interaction and economics, in which it is maintained that social life is principally capable of explanation as the outcome of the 'rational choices' of individual actors ... It is a form of theorising characterised by the use of technically rigorous models of social behaviour, which seek to derive robust conclusions from a relatively small number of initial theoretical assumptions about 'rational behaviour'. Rational choice theories have been in vogue over the last two decades, prompted by dissatisfaction with macroscopic and structural models in some circles but also by an increased centrality for the rhetoric of individual rational choice in many areas in economic and political life. Despite its often impressive formal architecture, and its undoubted value in illuminating some areas of social reality, two important limitations of rational choice theory can be noted ... (a) its relative lack of success in overcoming numerous technical difficulties, e.g. a regress in actors' expectations concerning the actions of others, which limit its formal rigour and undermine the direct applicability of its models; (b) an association with positivist and pragmatist epistemologies, which has limited its attention to analysis of action located

in norm-guided, rule-following and rule-changing social behaviour. (Jary and Jary 2000, p. 507)

Reflection

It is the specifically reflexive form of the knowledgeability of human agents that is most deeply involved in the recursive ordering of social practices. Continuity of practices presumes reflection, but reflection in turn is possible only because of the continuity of practices that makes them distinctively 'the same' across space and time. Hence, 'reflection' should be understood not merely as 'self-consciousness' but as the monitored character of the ongoing flow of social life. (Giddens 1984, p. 3)

Science, Technology and Society Studies

[Address] the relationship among knowledge, the individual, the group, social structures and institutions, and technology. (Van House 2004, p. 33)

Social Action

[Sociology is] a science which attempts the interpretive understanding of social action in order thereby to arrive at a causal explanation of its course and effects. In 'action' is included all human behaviour when and in so far as the acting individual attaches a subjective meaning to it. Action in this sense may be either overt or purely inward or subjective; it may consist of positive intervention in a situation, or deliberately refraining from such intervention or passively acquiescing in the situation. Action is social in so far as, by virtue of the subjective meaning attached to it by the acting individual (or individuals), it takes account of the behaviour of others and is thereby oriented in its course. (Weber 1968, p. 3)

Not every kind of action, even of overt action, is 'social' in the sense of the present discussion. Overt action is non-social if it is oriented solely to the behaviour of inanimate objects. Subjective attitudes constitute social action only so far as they are oriented to the behaviour of others. For example, religious behaviour is not social if it is simply a matter of contemplation or of solitary prayer. The economic activity of an individual is only social if, and then only in so far as, it takes account of the behaviour of someone else. (Weber 1968, p. 4)

Not every type of contact by human beings has a social character; this is rather confined to cases where the actor's behaviour is meaningfully oriented to that of others. For example, a mere collision of two cyclists may be compared to a natural event ... Social action is not identical either with the similar actions of many persons or with action influenced by other persons. It is not proposed in the present sense to call action 'social' when it is merely a result of the effect on the individual of the existence of a crowd as such and the action is not oriented to that fact on the level of meaning (Weber 1968, p.5).

Social Action: Types

The four ideal types of social action identified by Max Weber: (a) *zweckrational* or *instrumental action* (as in models of 'rational economic action' developed within economics) where the actor weights the relative efficiency or different available means to an end, and sometimes also the ends themselves, seeking to maximise benefits; (b) *wertrational action* or *value rationality* where the relative effectiveness of alternative means to an end may be assessed but the ends are accepted as given, perhaps as a moral imperative, as in the protestant work ethic; (c) *affectual action* where action is governed by emotion; (d) *traditional action* where action is governed by customary or habitual practice. (Jary and Jary 2000, p. 648)

Social Informatics

Interdisciplinary study of the design, uses and consequences of information technologies that takes into account their interaction with institutional and cultural contexts. (Kling 2000, p. 218)

Social System

1. any, especially a relatively persistent, 'patterning of social relations across 'time-space', understood as produced practices' (Giddens 1984). Thus, in this general sense, a society or any organisation or group constitutes a social system. For Giddens, however, social systems are highly variable in the degree to which they manifest a 'systematic pattern'. They 'rarely have the sort of internal unity' true of biological systems or of the kind usually assumed by functionalism ...
2. (more specifically, as in functionalism) any persistent system of interaction between two or more social actors up to and including a unitary society, especially where this is associated with a tendency of the system to boundary maintenance, i.e. to preserve its position vis-à-vis its external environment, whether this be other social systems or the physical world. In Parsons' thinking ... and in most modern forms of functionalist and structural-functionalist sociology, such a conception of social system has been particularly associated with conceptions of functional prerequisites of societies and of societies as self-maintaining systems, etc. (Jary and Jary 2000, p. 580)

Social Structure

1. any relatively enduring pattern or interrelationship of social elements, e.g. the class structure.
2. the more- or less-enduring pattern of social arrangements within a particular society, group or social organisation, e.g. the 'social structure of Great Britain'. No single agreed concept of social structure exists in sociology, despite its widespread usage. The definition employed depends upon the theoretical perspective within which the concept is used ... In general, disagreement exists as to whether the most decisive elements of social structure consist of the 'surface' rules, roles and social institutions ... or whether these arise from mechanisms and processes which are hidden from view but which underpin social life, as for Marx or for Lévi-Strauss (see also structure,

structuralism). Whilst the focus on the interrelation of social parts, and hence 'structural' thinking, can be seen as one of the defining features of sociology, numerous reservations exist about the uses to which the concept of social structure is put. Disagreement and debate about the role of structural thinking in sociology derives from the differences of degree, if not of kind, which would seem to exist between the types of structures that exist in the physical and the biological world and social structures. Reservations exist particularly about the appropriateness of mechanical and biological analogies and the use of conceptions of homeostasis, function and social system, as well as conceptions of teleology in sociology (see functionalism). The fact is that social structures do not possess the relatively clear-cut 'boundaries' in time and space of many physical and most biological structures, nor do they possess the precisely identifiable tendencies to homeostasis possessed by organic structures. (Jary and Jary 2000, p. 578)

In structuration theory, 'structure' is regarded as rules and resources recursively implicated in social reproduction; institutionalised features of social systems have structural properties in the sense that relationships are stabilised across time and space. 'Structure' can be conceptualised abstractly as two aspects of rules: normative elements and codes of signification. Resources are also of two kinds: authoritative resources, which derive from the co-ordination of the activity of human agents, and allocative resources, which stem from control of material products or of aspects of the material world. (Giddens 1984, p. xxxi)

Social Theory

A term used to refer to all or any general theoretical accounts of social relations, whatever their disciplinary base or origin ... Given the open-ended and eclectic nature of sociology as a discipline ... the distinction between sociological theory and social theory is not a hard-and-fast one and many sociologists in fact prefer to work with whichever theories appear most relevant, whatever their disciplinary source ... In doing this they may sometimes also prefer to present themselves as 'social theorists'. (Jary and Jary 2000, p. 580)

Sociological Theory

The range of abstract, general approaches and competing and complementary schools of thought which exist in sociology. While sociological theory in this sense includes some theories which are 'formalised' or mathematical in form (see theory, mathematical sociology), more usually 'theory' in sociology is looser in form, referring to the main 'approaches', intellectual paradigms, conceptual schemes, etc., which exist within the discipline. The following are among the main general theoretical approaches usually identified within sociology: (a) functionalism, sometimes but not always including evolutionary sociology; (b) symbolic interactionism and interpretative sociology, including action theory; (c) Marxist sociology and conflict theory; (d) formal sociology; (e) social phenomenology and ethnomethodology; (f) structuralism and poststructuralism ... Some sociologists, notably Merton calling for what he referred to as theories of the middle range, have sought to escape from the

emphasis on competition between such general theoretical frameworks, placing a far greater emphasis on 'working' explanatory theories and sensitising concepts that arise from research and interpret findings. (Jary and Jary 2000, pp. 583-584)

Symbolic Interactionism

A theoretical approach in US sociology which seeks to explain action and interaction as the outcome of the meanings that actors attach to things and to social action, including themselves. For symbolic interactionists, meanings 'do not reside in the object' but emerge from social processes. Emphasis is placed on the 'active', 'interpretive' and 'constructive' capacities or competence possessed by human actors, as against the determining influence of social structure suggested by theoretical approaches such as functionalism. Human action is seen as distinguished from animal behaviour above all by language and by the huge importance of symbolic communication of various kinds. As well as being the main alternative theoretical approach to functionalism ... symbolic interactionism also provides the main alternative approach in social research to conventional social survey using fixed choice questionnaires and standardised variables. In place of these approaches, its preferred methods include participant observation of actors in natural settings and intensive interviews ... The main criticism of symbolic interactionism is that in focusing exclusively on microsocial processes and subinstitutional phenomena, it understates the importance of macroscopic structures and historical factors, especially economic forces and institutionalised political power. Thus, rather than exclusive perspectives, sociological foci on structure and action are seen as complementary perspectives by many theorists, e.g. Giddens. (Jary and Jary 2000, pp. 622-623)

1. Introduction

1.1 Background

There is a growing understanding among decision makers and the modelling community that the social sciences need to inform the analysis of and anticipation of terrorism. However, an integration of the social sciences into modelling is a complex issue that has only begun to be approached (Hamon 2005; Morrison and Macal 2005; Turnley 2005). There are no ready procedures and recommendations on how to use the social scientific knowledge in terrorism modelling.

This report aims to inform social modelling in support of counter-terrorism research and practice. It discusses issues and problems related to the integration of social scientific knowledge in modelling of the origins and causes of terrorism and other forms of political violence, terrorists' behaviour, the structure of terrorist organisations and networks, the threat of terrorism, and influence strategies and actions directed towards terrorism threat anticipation and minimisation. This study is addressed to social scientists and modellers involved in the modelling of terrorism. It aims to help social scientists better understand the modellers' needs and the kind of contribution that they may require from social sciences. It can also help modellers (computer scientists, engineers, physicists and mathematicians) know more about the epistemological and methodological problems related to the integration of social scientific knowledge into modelling. The report also aims at mapping those social disciplines, theories, and approaches that can better inform the modelling of specific phenomena, e.g. analysis of the causes of violence and terrorism threat anticipation, terrorism network analysis and modelling of terrorism threat perception.

As a discussion starting point, this report uses papers presented at the *Joint Threat Anticipation Center (JTAC) Workshop*.¹ The workshop participants included developers of modelling and simulation tools, social theorists, scholars conducting empirical studies of economics, political history and culture, and government sponsors. The participants discussed quantitative and qualitative methods in studies of terrorism, mass violence and conflicts, suggested models of human behaviour response to the threat of terrorism, and presented modelling and simulation tools. A comprehensive outline of all presentations is beyond the scope of this report. In this report, selected presentations are used in order to identify the key topics that are currently discussed in the area of terrorism modelling, focusing on epistemological and methodological issues emerging due to the integration of the social sciences into terrorism modelling. The discussion of these issues is then enhanced by addressing a broader range of social studies of terrorism and a more detailed outline of social theories and approaches that have been mentioned by the discussants or those that can usefully inform terrorism modelling.

¹ See *Threat Anticipation: Social Science Methods and Models* (2005). The JTAC Workshop was hosted by the University of Chicago and Argonne National Laboratory (ANL) and sponsored by the Defence Threat Reduction Agency/Advanced Systems Concepts Office (DTRA/ASCO).

1.2 Report Objectives

The report objectives are to:

- explore the state of the art in the area of terrorism modelling, focusing on the modellers' ideas regarding the kind of social scientific knowledge they require;
- explore and explain how the social sciences can contribute to terrorism modelling;
- identify the key problems emerging in the process of using social scientific knowledge in modelling.

The expected outcomes are:

- understanding of the social sciences' potential contribution to terrorism modelling;
- identification of social disciplines, approaches and theories that can inform the modelling of specific phenomena related to terrorism, such as the origins and causes of terrorism, terrorist networks, motivations and activity, and the effects of terrorism upon human behaviour;
- development of recommendations related to the use of social scientific knowledge in terrorism modelling.

1.3 Report Structure

This report consists of five sections.

Section 1 'Introduction' grounds the report topic within the current trends in terrorism threat analysis, formulates the report objectives and outcomes, and outlines the report structure.

Section 2 'Approach' explains why the social sciences need to be integrated into the modelling R&D that supports the work of the national security and threat reduction agencies. It also discusses social modelling as an interdisciplinary research practice and suggests an approach to assessment of terrorism models.

Section 3 'Terrorism modelling' discusses papers presented by representatives of the modelling community. It aims to identify problems related to the modelling of terrorism, and outlines and analyses the modellers' expectations in regard to the social science's contribution.

Section 4 'Social studies of terrorism' discusses papers presented by representatives of the social scientific community. It aims to demonstrate how the social sciences can contribute to the modelling of terrorism. It also outlines the difference between the objects of research in the social and natural sciences, discusses the heuristic significance of social scientific concepts for terrorism modelling, and formulates problems related to the use of quantitative and qualitative data.

Section 5 'Conclusion' summarises the discussion and formulates further research directions.

2. Approach

2.1 Terrorism: A New Threat and a New Object of Modelling

Terrorism is not a new phenomenon, yet only recently it began to be perceived as a major threat to states and the entire global order. This fact has been widely acknowledged in numerous books, articles, media, government documents and political leaders' speeches. As Walter Lacquer put it:

Terrorism has been on the international agenda for a long time, but until fairly recently it was relegated to a lowly place. From time to time, following some spectacular attack, terrorism would figure prominently in the media for a few days. There would be deliberations on the highest level of government, committees would be appointed and resolutions passed. But when calm returned the issue would be forgotten, for there seemed to be no particular urgency to deal with it. There were always some very important domestic and foreign issues that would take precedence, and in any case terrorism never threatened all countries in an equal measure. This has now changed, and terrorism is bound to remain high on the list of our priorities. (Lacquer 2003, p. 7)

It is useful to distinguish between the 'terrorism as a new kind of threat' issue and the 'new terrorism' issue. The 'terrorism as a new kind of threat' issue has an interdisciplinary nature. This issue is relevant because the agencies and organisations which traditionally dealt with military threat are now getting involved in counter-terrorism, with the implication that they need to re-examine their practices and methods according to the changing nature of threatening actors and their capabilities. The 'new terrorism' issue is a focus of political science aiming at the categorisation of terrorism (political, criminal, biological, 'Islamic', etc.) as 'traditional' and 'new' and understanding the difference between traditional and more recent kinds of terrorist activity (Tucker 2001).

Acknowledgement of the importance of the threat of terrorism entails the necessity for many agencies and communities dealing with threats to rethink their practices and to adjust to the new challenges generated due to the changing nature of the threat. They need to understand how the threat posed by terrorists differs from the threats they dealt with before (mainly, the threats created by state actors), and to understand what implications this may have for the agencies' work practices and for the R&D that supports their work.

The JTAC Workshop participants discussed this issue from two perspectives: the perspective of a scientist employed in a threat anticipation government agency and the perspective of a social scientist involved in the task of establishing cooperation between social sciences and threat anticipation agencies. For example, Stephen Younger (2005a) compared the threat during the cold war period with the threat in the new, post-post cold war period (war on terrorism). The main difference is that in this new period, the ability of destruction moved from nation-states to small groups and even individuals. This move made it necessary for the national security community to think of *culture* and *identity*, rather than *nation-state*, as something that relates to threat anticipation. The origins and causes of threat and violence need to be analysed rather than the symptoms (the activity in which the threat has materialised). New kinds of knowledge are needed: knowledge of other cultures (rather than knowledge of nation-state military capabilities) and knowledge of the conditions for the

emergence of terrorism and other forms of political violence. To sum up, anticipation and minimisation of the new threat requires that the precision of the mathematical sciences is combined with insights from the social sciences, as Stephen Younger put it. Kathleen Morrison (Morrison and Macal 2005) outlined the *Argonne/Chicago Collaboration in the Social Sciences* program and identified the threat-related issues requiring a cooperation of government organisations, computational scientists and social scientists (political science, economics, sociology, anthropology, psychology, linguistics, history, human development, international studies and language studies). The interaction and cooperation of these different disciplines (communities) is needed because: (a) the nature of the threats is diverse and changeable: hence, analysis and strategic thinking should be diverse as well; (b) most problems are global in scale, but with specific local implications: hence not only social scientists, but experts in local cultures (linguists, historians and so on) are needed; (c) threat reduction operates on multiple levels: hence, theoretical issues should be discussed in order to understand how to bring these different levels together; and (d) human behaviour is always an issue: hence, social sciences studying social actors are needed.

Table 1 summarises the main features of the new threat and shows those disciplinary fields that are needed in order to understand and anticipate the new threat.

Table 1 The changing nature of threat: the sciences required

Kind of threat	Threatening actors	Object of threat reduction	Key concepts	Sciences required
<i>Cold War period: Traditional military threat</i>	Nation-states	Symptoms of threat	The nation-state military capability	<i>Physical sciences</i> <i>Computational sciences</i>
<i>Post-Cold War period: New threat: global terrorism</i>	Small groups Individuals	Origins and causes of threat	Social actors Cultures Identities Social structures and networks Systemic conditions Historical causes	<i>Physical sciences</i> <i>Computational sciences</i> <i>Social sciences:</i> History, International Studies, Political Science, Economics, Sociology, Criminology, Cultural Studies, Psychology, Social Psychology, Linguistics, Cross-cultural Communication studies, Social Anthropology

2.2 Terrorism Modelling as Interdisciplinary Research

In order to successfully integrate the social sciences in terrorism modelling, a conceptual bridge needs to be built between different disciplinary areas. This means that terrorism needs to be conceptualised as an object of interdisciplinary research. Construction of an

object of interdisciplinary research needs to be informed, on the one hand, by epistemology, philosophy of science, systems theory, social theory and sociology of science. On the other hand, conceptualisation of terrorism as an object of modelling involves analysis of the end user's needs and has to be linked to a given modelling team's approaches, methods and techniques.

In this report, Shchedrovitsky's (1995a, 1995b) system approach to the construction of an object of interdisciplinary research is adopted. Shchedrovitsky explains that researchers deal not with an ontological object (object 'as such', intuitively known), but with multiple *representations* of the object. Those representations are given to the researcher in the form of facts or empirical materials, models, ontological schemes, methods and techniques, and in the form of problems and specific tasks. Therefore, according to Shchedrovitsky, the construction of an object of interdisciplinary research requires establishing links between different visions of this object developed within specific disciplines. Establishing those links, Shchedrovitsky argues, requires that the different disciplinary concepts were first deconstructed and critically analysed as being shaped by epistemological and theoretical assumptions and methodological approaches developed within a specific discipline and/or practice. According to this approach, the concept of terrorism as an object of modelling will differ from the concepts of terrorism developed in those disciplines (sociology, psychology, etc.) to which the modeller turns in search for subject matter expertise and empirical data. Conceptualisation of terrorism as an object of modelling requires an explication and critical assessment of the epistemological assumptions, methodological limitations and expectations that scientists (computer scientists, mathematicians, engineers and social scientists) involved in terrorism modelling may have. This report aims to contribute to this task.

This report, therefore, does not aim to provide a comprehensive assessment of the models of terrorism or to offer yet another 'true' definition of terrorism and reveal the true causes of political violence or explain terrorists' motivations. Defining terrorism and exploring specific cases are the focus of social studies of terrorism, e.g. Horgan 2005 and Schmid 2004. Those involved in terrorism modelling need to be able to assess the heuristic significance of the existing definitions and research findings for modelling.

Also, this report does not aim to assess the threat of terrorism in terms of its probability and the threatening agent's capability. Such an assessment is what the end user of models (analyst, decision maker) might wish to do. Modellers develop tools supporting such an assessment by enabling the user to identify factors (political, economic, demographic, cultural) that need to be assessed and to explore their role in the increase/minimisation of threat. In order to support this activity, models and tools need to be grounded within adequate conceptual models of the analysed phenomena. It is, therefore, necessary that the modeller/social scientist draws upon the knowledge/studies of a current situation, the history and the culture of a society/group/organisation whose analysis they support. Exploration of those societies and those factors per se is not the primary task of the social scientist member of a modelling team. The task of the social scientist is to understand how to get the relevant knowledge from subject matter experts (what questions to ask) and how to use this knowledge in order to develop a model (analytical framework, tool) that will enable the analyst exposed to an ocean of disconnected facts, data and opinions to identify the relevant factors and to link them in a meaningful way.

Different social disciplines (economics, social theory and epistemology of social research, demographics, quantitative sociological research, qualitative social research, cultural studies, etc.) can contribute to terrorism modelling in different ways. From the perspective of an organisation of interdisciplinary R&D, it is important, therefore, to identify each disciplinary area's potential contribution to terrorism modelling. In this report, two assessment perspectives are suggested: their potential contribution to terrorism modelling as a research practice (heuristic significance) and their potential effects upon counter-terrorism practice (utility).

Heuristic Significance

The heuristic significance of different social sciences, theories and data for terrorism modelling needs to be assessed in order to decide what social sciences can better inform development of particular types of models, analytical frameworks and modelling/simulation tools. The assessment of the heuristic significance of models and/or social scientific knowledge can be conducted along two lines. Firstly, it is necessary to identify the level on which a terrorism-related phenomenon can be approached within a given discipline or model: individual, group or societal. Secondly, it is necessary to define the kind of knowledge that can be used in modelling: theoretical insights on the nature of terrorism-related phenomena; epistemological assumptions; quantitative empirical data; qualitative (interpretative) data; or methods and techniques.

Utility

Assessment of the contribution of the social sciences to terrorism modelling also requires an understanding of the broader sociocultural effects that particular concepts of terrorism and related phenomena can have upon the practices of counter-terrorism agencies and organisations. It is useful to understand whether they can answer specific needs of the stakeholders involved in anticipation, prevention or minimisation of the threat of terrorism: counter-terrorism agencies; security agencies; intelligence analysts; strategic analysts and decision makers. Concepts of terrorism can focus on various aspects: the conditions of violence in different societies; the probability of terrorism; the effects of terrorism upon human behaviour; and the structure and the dynamics of terrorist organisations and networks. Therefore, an understanding of the potential implications of a particular conceptualisation requires an identification of the aspects of terrorism that this conceptualisation focuses upon and can help analyse.

2.3 Summary

Integration of social scientific knowledge in modelling requires answering such questions as: What kind of knowledge (social research) is needed for terrorism modelling? What kind of knowledge can the social sciences provide? How can social scientific knowledge be used in modelling?

The report highlights issues and problems that emerge due to the specific nature of the objects of research in social sciences, the epistemological status of empirical data, and the necessity to integrate qualitative research findings and theoretical insights in modelling.

Analysis and discussion of the contribution of the social sciences to terrorism modelling is conducted in relation to two issues: the heuristic significance of social theories and research findings; and the models utility and broader societal effects. Table 2 presents a framework that can guide our analysis of the contribution of the social sciences to terrorism modelling.

Table 2 Framework for an assessment of the contribution of social science to terrorism modelling

Assessment perspectives	The kind of contribution
HEURISTIC SIGNIFICANCE of the social sciences for terrorism modelling	Conceptual frameworks and empirical data: <ul style="list-style-type: none"> - typologies of societies - quantitative and qualitative typologies of terrorism - linking the societal, group and individual levels of analysis - integration of the human (social) and resource elements of terrorist activity - identification of relevant data, factors and indicators - translation of social scientific knowledge into modelling - the integration of culturally specific knowledge into modelling
UTILITY of the social sciences for counter- terrorism practice	Relating conceptual frameworks to the needs of the counter-terrorism practitioner by helping the practitioner understand: <ul style="list-style-type: none"> - the origins of mass violence - the perception of terrorism in different communities - terrorism threat anticipation - terrorist networks and organisations - the social process and changes in specific societies - culturally specific practices and meanings

3. Terrorism Modelling

This section reviews and discusses papers presented by the modelling community at JTAC. It aims to highlight problems related to the modelling of social phenomena, including terrorism, and outlines and analyses the modellers' expectations in regard to the social science's contribution to the development of models supporting an analysis of terrorism-related phenomena. This section focuses upon issues related to the origins of mass violence, terrorism threat anticipation, terrorism threat perception, terrorist networks and activity, and sociocultural factors in threat assessment.

3.1 The Origins of Mass Violence

3.1.1 Stephen Younger on Simulation of the Origins of Mass Violence in Egalitarian Societies

Stephen Younger (2005a) presented a paper on the role of the social science as a source of conceptual models and data for modelling. He shared his experience of using anthropological studies in order to simulate the origins of mass violence (see also Younger 2004, 2005b). Younger's works present a rigorous and methodologically-sound approach to the use of anthropological research in simulation. His major goal was the development of the methodology of a simulation of processes in real societies. The objects of analysis in Younger's simulations were 'simple', or 'egalitarian', societies. Younger suggested that if we can model processes in egalitarian (less complex) societies then we can learn how to model processes in more complex societies. Younger anticipated the anthropologists' argument that those societies he calls simple (egalitarian) are, in fact, very complex. He suggested, nevertheless, that they can be considered simple in relation to modern (non-egalitarian) societies. It is this distinction that needs to be discussed in more detail in order to understand how to simulate the origins of mass violence in different types of societies.

3.1.2 Discussion: Social Solidarity in Traditional and Modern Societies

The difference between the egalitarian (traditional) society and the non-egalitarian (modern) society is manifested by the existence of essentially different types of relationships between social actors. Durkheim (1964) argues that traditional and modern societies are characterised by two essentially different types of solidarity, mechanical and organic solidarity respectively:

The distinction drawn by Emile Durkheim ... between two types of social solidarity: *mechanical solidarity*, based on the similarity between individuals, the form of solidarity predominant in simple and less advanced societies, and *organic solidarity*, based on the division of labour, and complementarities between individuals, the form of solidarity ideally occurring in modern advanced societies. Durkheim formulated the distinction between the two types of solidarity by identifying the demographic and morphological features basic to each type, the typical forms of law, and formal features and content of the *conscience collective*, which ought to be associated with each type. (Jary and Jary 2000, p. 377)

Lukes (1973) summarises Durkheim's concepts of the types of society characterised by the mechanical and the organic solidarity as follows. *Mechanical solidarity* exists in the societies characterised by a relatively low volume of population and relatively low material and moral density (small-scale and less advanced societies). This type of society is based on resemblances; it is either clan-based or territorial and social bonds are relatively weak, which means that there is little interdependence between the members. Social relationships are regulated mainly with the help of repressive sanctions and penal law prevails. Collective conscience (shared beliefs and moral attitudes) plays an important role and the collective authority is absolute in the societies characterised by mechanical solidarity. The collective conscience is highly religious and supreme value is attached to society and interests of society as a whole. *Organic solidarity* emerges in the societies characterised by a relatively

high volume of population and relatively high material and moral density. This type of society is based on division of labour and is characterised by fusion of markets and growth of cities. Due to division of labour and, consequently, much interdependence, social bonds are relatively strong in such society. This society is regulated with restitutive sanctions and cooperative law (civil, commercial, administrative and constitutional). The role of collective conscience is less important, and individual initiative and reflexion are allowed. The collective conscience is increasingly secular; it is human-orientated and open to discussion. Supreme value is attached to individual dignity, equality of opportunity, work ethics and social justice.

These two types of solidarity entail different strategies of interaction and conflict resolution. Therefore, the modelling of a probability of mass violence in different types of societies should be based on different assumptions. For example, the modelling of societies based on mechanical solidarity can be based on an assumption that the probability of mass violence depends upon resource supply. The mechanical solidarity is based on the sense of tribal connection; the *Other* is perceived as a competitor for resources with the implication that violence against the other is considered the most optimal, or the most natural, kind of interaction under the conditions of scarce resources. Therefore, theoretically, the probability of mass violence (under conditions of scarce resources) is higher in those societies in which mechanical solidarity dominates. Organic solidarity is based on the interdependence of social actors and, theoretically, should encourage (or make more reasonable) peaceful conflict resolution because cooperation is necessary for the survival of a society based on division of labour. This means that modelling of modern societies cannot be based on an assumption that the probability of mass violence is dependent upon resource supply.

The above discussion aimed at showing that the qualitative specificity of different types of societies needs to be taken into account when social processes and changes in different societies are modelled. It is not that obvious, however, which qualitative characteristics of societies (what typologies of societies) may be relevant. Societies can be categorised in multiple ways (the social solidarity typology is just one of many possible) and for multiple purposes. In order to choose a typology relevant for the problem at hand, researchers need to assess the existing typologies in terms of their heuristic significance for an analysis of a particular social phenomenon, e.g. for an analysis of the conditions of the emergence of mass violence.

Social scientists working with a modelling team can contribute to this task by providing an overview of existing typologies and by analysing a particular typology's relevance to the purposes of modelling. The outcome of this kind of research should be a framework relating types of societies to the types of issues and problems that need to be supported by modelling tools. Such a framework can help modellers identify relevant social disciplines, theories and approaches. The development of such a framework belongs to the area of social theorising.

Also, such a framework can serve the purposes of interdisciplinary communication as it can help the modellers describe their own and the end users' needs and questions in social scientific terms. Therefore, the development of this framework needs to be linked to an exploration of the modeller's and the user's needs and practices. This kind of research belongs to such areas as Science, Technology and Society Studies, social informatics and workplace studies.

This discussion is summarised in Table 3.

Table 3 Modelling the origins of mass violence: the contribution of the social sciences required

Social sciences	Heuristic significance	Utility
<i>Cultural Anthropology, Ethnography, Sociology, History</i>	Studies of specific societies, conceptual models and empirical data	Understanding the origins of mass violence in different societies
<i>Social theory</i>	Development of the typologies of societies relevant for specific modelling purposes and methods	
<i>Science, Technology and Society Studies, Workplace Studies, Social Informatics</i>	Frameworks relating typologies of societies to the needs and questions of the modeller and the end user of models and modelling tools.	

3.2 Threat Perception and the Typologies of Terrorism

3.2.1 Thomas Baldwin on Terrorism Threat Perception

Thomas Baldwin (2005) presented a paper on models of threat perception that are used in order to analyse the effects of terrorism (and other kinds of threat) upon public confidence and human behaviour. In his presentation of the *Terrorism Threat Perception Response System*, he argued that development of such models needs to draw upon a certain typology of terrorism. He argued that models of public confidence should be sensitive to such diverse factors as the frequency of incidents, geographical proximity, social identification of victims, level of consequences and psychological internalisation of vulnerability (personal risk).

The presented model does not, however, take all these factors into account. In particular, the audience criticised it for its inability to take the moral dimension of terrorism into account. It was argued that such a factor as who the victims are plays a big role in the perception of the threat of terrorism and that terrorism perception is as much an emotional response as a rational response. The suggested model was also criticised for establishing a linear dependence between the perception of threat and the number of victims (the higher the number, the lower public confidence). It has been suggested that the dependence between the numbers of deaths and human perception of these numbers is not linear because 'number of deaths' is not just a quantitative concept due to the moral dimension of terrorism.

3.2.2 Discussion: Quantitative and Qualitative Typologies of Terrorism

This discussion focuses on the following issues:

- the purposes of studying terrorism perception and the kinds of phenomena that should be the object of research;

- conceptualisation of terrorism for the purposes of terrorism perception modelling. Quantitative and qualitative typologies of terrorism are outlined and their utility and heuristic significance for the purposes of terrorism perception modelling are discussed;
- theoretical approaches that enable the linking of quantitative and the qualitative typologies of terrorism.

Terrorism Perception Modelling: Object and Purposes

It is important that terrorism perception modelling would not be confused with psychological studies of the emotional state of terrorism victims (hostages, survivors and close people). Psychological studies of terrorism perception analyse such emotions as terror, fear, sense of loss, etc. They contribute to post-traumatic assistance to people suffering from such emotions and they use such data as the participants' self-accounts and narratives related to their feelings. Models of terrorism perception support an analysis of the public reaction towards terrorism events or the threat of terrorism. This analysis can be used in order to inform government's assessment of public confidence in certain periods. It can also be used for strategic and political decision making, for shaping public opinion and for an analysis of economic behaviour. Development of terrorism perception models requires data on public attitudes towards terrorism in general, terrorism events or terrorist groups and movements on the one hand and certain typologies of terrorism on the other hand. This discussion focuses on the typology issue.

The following two general approaches to terrorism typologisation can be identified: quantitative and qualitative.

Quantitative Typologies of Terrorism

Within the quantitative approach, terrorism and the threat of terrorism are typologised on the basis of data about the number of attacks, increase/decrease of terrorist activity, cost of material damage and fatalities and injuries rate (see Coffin 2005, Lyon 2003, Swanström and Björnehed 2004). The quantitative typologies inform an analysis of the threat of terrorism, which provides rationale for increasing attempts in national security, coordination of national agencies and sharing information between states. For example, Swanström and Björnehed analyse the number and intensity (measured in fatalities and injuries) of terrorist attacks in Southeast Asia and use this analysis as a rationale for increasing international counter-terrorism cooperation in this region:

Here, one can observe an increasing trend in the growing number of injuries and fatalities in recent years. Out of the 617 injuries and 282 deaths from the terrorist attacks between 1986 and 2002, 139 injuries and 32 deaths occurred between 1986 and 1994. The other 478 injuries and 250 fatalities were the result of the international terror attacks between 1995 and 2002. In a sense, if one wants to argue the de-escalation in international terrorist attacks in Southeast Asia in recent years, this increase in fatalities and injuries is even more horrifying. This since it indicates that the scope of the attacks means that less attacks resulted in increasing numbers of fatalities and injuries. (Swanström and Björnehed 2004, p. 330)

The quantitative typologies of the threat of terrorism seem to be quite useful for insurance companies or to government agencies dealing with the material consequences of terrorism². However, these typologies are not that useful for an analysis of the public perception of terrorism because there is no linear dependence between those figures and people's perception of their and others' losses. Rather than be taken and compared in terms of their abstract (and, therefore, meaningless) value, the quantitative data (number of terrorist attacks and, in particular, number of casualties) need to be interpreted in the light of *relative deprivation theory*. According to this theory, 'people take the standards of significant others as a basis for self-appraisal and evaluation' (Merton 1968, p. 40), which means that the dependence between loss (measured in 'objective' numbers) and people's perception of their loss is not linear. Merton explains this as following:

Common sense, for example, would suggest that the greater the actual loss experienced by a family in a mass disaster, the more acutely it will feel deprived. This belief is based on the unexamined assumption that the magnitude of objective loss is related linearly to the subjective appraisal of the loss and that this appraisal is confined to one's own experience. But the theory of relative deprivation leads to quite a different hypothesis – that self-appraisals depend upon people's comparisons of their own situation with that of other people perceived as being comparable to themselves. This theory therefore suggests that, under specifiable conditions, families suffering serious losses will feel *less* deprived than those suffering smaller losses if they are in situations leading them to compare themselves to people suffering even more severe losses. For example, it is people in the area of greatest impact of a disaster who, though substantially deprived themselves, are most apt to see others around them who are even more seriously deprived. The confirmed conclusion can then be put simply enough: when few are hurt to much the same extent, the pain and loss of each seems great; where many are hurt in greatly varying degree, even fairly large losses seem small as they are compared with far larger ones. The probability that comparisons will be made is affected by the differing visibility of losses of greater and less extent. (Merton 1968, pp. 40-41)

Qualitative Typologies of Terrorism

In the case of terrorism, people's perception may also be affected by qualitative (ideological, psychological and moral) dimensions of terrorism. There are different qualitative typologies of terrorism. Terrorism types can be defined in terms of: the ideological platform of terrorism; in relation to the context in which terrorism is situated; the ends and means of political struggle; the character of targets; and so on. In terms of ideological platform, the following types of terrorism can be identified: right-wing, left-wing, ethnonationalist/separatist, and religious (Cronin 2004).³ In terms of the context in which it is situated, terrorism can be conceptualised as crime, politics, warfare, communication or religious fundamentalism (Schmid 2004).

The qualitative typologies play an important role in studies of terrorism perception, in particular because the polemic (war of words) regarding labelling particular groups as terrorists often 'involves confusion, unintended or deliberate, between ends and means. A particular group or organisation cannot be waging a terrorist campaign because it hopes to

² See Resnyansky (2006) for a critical analysis of the societal and strategic implications of the concepts of terrorism developed within the quantitative approach.

³ These categories are often overlapping.

achieve some (self-defined) noble purpose' (Weinberg, Pedahzur and Hirsch-Hoefer 2004, p. 778).

In comparison to the quantitative typologies, qualitative typologies may seem 'subjective' because they are more visibly shaped by disciplinary differences and are affected by intellectual bias. However, these typologies allow a better understanding of the psychological dimension of terrorism. The psychological dimension is important because:

It might bring us closer to some of the root causes of terrorism. If we confine ourselves to a single framework – for instance, a military war framework – we might misunderstand the full nature and scope of the terrorist motivations and modes of operation. All relevant aspects need to be properly considered to understand terrorism in all its forms and manifestations. (Schmid 2004, p. 214)

Therefore, the qualitative typologies can usefully inform the activity of organisations and agencies that aim to prevent terrorism or are involved in counter-terrorism and anti-terrorism operations. They may be not that useful for modelling public perception of the threat of terrorism, though, as that perception tends to focus on the events and effects (losses and damages) rather than on the roots and causes of terrorism. In order to model the public perception of the threat of terrorism, the qualitative and the quantitative typologies of terrorism need to be linked in a certain way.

Models of public perception of the threat of terrorism need to incorporate knowledge about meanings that people assign to terrorism events and effects because people react differently to risks/damages/losses caused by accidents and risk/damages/losses resulting from someone's purposeful action. Also, people's perception of terrorist events involves emotional and moral responses that significantly depend on who and how distant the target is. In order to model public perception of the threat of terrorism, a typology of terrorism is needed that establishes correlations between terrorism perception and such factors as character of losses (material damage or human victims); the target (military or civilians, official persons or ordinary citizens, adults or children); and the subjective meanings assigned to numbers, e.g. number of victims or cost of damages. Such a typology also needs to be socioculturally specific due to the fact that perceptions of terrorism can differ in different societies and cultures, as well as among different groups.

Therefore, a typology of threat for the modelling of threat perception needs to draw upon actual empirical studies of the perception of the threat of terrorism in specific societies rather than upon abstract models of risk assessment developed in engineering. The empirical data obtained within primary psychological and social-psychological research of people's perception of terrorism need to be linked, on the one hand, to the qualitative typologies of terrorism developed in political science (where terrorism is categorised in terms of the target, purpose, etc.). On the other hand, these data need to be linked to the quantitative typologies of terrorism. Establishing such links can be informed by what Robert Merton (1968) has called *middle-range theories* (the relative deprivation theory outlined above is an example of a middle-range theory):

Middle-range theory is principally used in sociology to guide empirical inquiry. It is intermediate to general theories of social systems which are too remote from particular classes of social behaviour, organisation and change to account for what is observed and

to those detailed orderly descriptions of particulars that are not generalised at all. Middle-range theory involves abstractions, of course, but they are close enough to observed data to be incorporated in propositions that permit empirical testing. Middle-range theories deal with delimited aspects of social phenomena, as is indicated by their labels. One speaks of a theory of reference groups, of social mobility, or role-conflict and of the formation of social norms just as one speaks of a theory of prices, a germ theory of disease, or a kinetic theory of gases. (Merton 1968, pp. 39-40)

The discussion is summarised in Table 4.

Table 4 Modelling terrorism perception: the contribution of the social sciences required

Social sciences	Heuristic significance	Utility
<i>Psychology, Social Psychology, Sociology</i>	Empirical studies of public perception of terrorism in different societies	Understanding the effects of terrorism upon public confidence and human behaviour
<i>Political Science</i>	Typologies of terrorism - qualitative and quantitative	Assessment of terrorism perception as being affected by quantitative and/or qualitative (moral, psychological, ideological) aspects of terrorism
<i>Social Theory</i>	Middle-range theories connecting empirical data and general theories of social systems	
	Conceptual frameworks that link the quantitative (number of human losses and damage) and the qualitative (moral and sociocultural) dimensions of terrorism and establishes their hierarchy	

3.3 Terrorism Threat Anticipation

3.3.1 Dhanurjay Patil on Threat Anticipation

Dhanurjay Patil (2005) outlined the three components of threat anticipation (obtaining data, assessing the current situation, and projecting and forecasting of threats) and argued that development of models supporting threat anticipation requires that long-term and short-term factors were connected. Further, he argued that it is necessary to bring different scales, or levels, of analysis together in order to model and anticipate the threat of terrorism.

3.3.2 Discussion: The Different Scales Problem in Social Theory

Terrorism is a complex phenomenon that has multiple aspects (causes and roots, actors, activity) and can be approached at different levels. For example, Cronin (2004) identifies four analytical frameworks for evaluating sources of terrorism: the individual, the group and organisation, the state, and the international system. Different social disciplines focus on different aspects of terrorism and analyse them on different levels. For example, the

conditions and the root causes of terrorism are explored within social theory (conflict between the nation-state, global society and tribal society), sociology (social inclusion/exclusion, perception of social grievances and hardship) and history and political science (specific causes and events). Individual terrorist actors can be studied within sociology (socio-economic and demographic profiling), psychology (character traits, inclination towards violence) and social psychology (motivations; socialisation). Terrorism researchers need to focus on a particular level according to their disciplinary area and their general methodological approach. Modellers often need to bring different levels of analysis together.

Integration of different levels within a unifying model is a complex issue. From the social scientific perspective, this task requires that theoretical and conceptual links are established between phenomena belonging to the societal level (structure, system, culture), the intermediate level (group, organisation) and the individual psychology and behaviour.

The problem of linking different levels of analysis is one of the most fundamental problems in the social sciences due to the lack of a unified, all-embracing sociological theory. In fact, such tasks as the development of a total system of sociological theory (*'the general sociological theory'*) has been heavily criticised as, for example, the following passage illustrates:

This search for a total system of sociological theory, in which observations about every aspect of social behaviour, organisation, and change promptly find their preordained place, has the same exhilarating challenge and the same small promise as those many all-encompassing philosophical systems which have fallen into deserved disuse. The issue must be fairly joined. Some sociologists still write as though they expect, here and now, formulation of *the general sociological theory* broad enough to encompass the vast ranges of precisely observed details of social behaviour, organisation, and change and fruitful enough to direct the attention of research workers to a flow of problems for empirical research. This I take to be a premature and apocalyptic belief. We are not ready. Not enough preparatory work has been done. (Merton 1968, p. 45)

The following comprehensive sociological theories have been identified by Merton (1968): Marxist theory, functional analysis, social behaviourism, Sorokin's integral sociology,⁴ and Parsons' theory of action⁵. Currently, sociological theories (intellectual approaches, schools of thought and conceptual schemes) also include symbolic interactionism and interpretative sociology, conflict theory, formal sociology, social phenomenology and ethnomethodology, and structuralism and poststructuralism (Jary and Jary 2000, pp. 583-584).

Social sciences are also differentiated in terms of the levels at which they operate and the general methodological approaches they use. These approaches are *methodological individualism* and *methodological holism*. The former explains social phenomena on the basis of the actions of individual persons, while the latter states these laws in terms of such larger (super-individual) entities as classes, sex groups or nations (Gordon 1991):

The doctrine of methodological individualism states that the scientific explanation of social phenomena must be based upon laws that refer to the actions of *individual persons*.

⁴ See P.A. Sorokin 1941, 1964.

⁵ See Parsons 1954, 1967.

The doctrine of methodological holism is that the important entities for most social phenomena are more comprehensive, such as socioeconomic classes, or the two sex groups, or nations; and the laws of social phenomena must be stated in terms of such larger entities or 'wholes'.

To some degree, the various social sciences can be differentiated in terms of the levels at which they operate. Historical writing of the older conventional sort is very holistic, focusing upon nations as entities. A. J. Toynbee in his multi-volume *Study of History* ... contended that even the nation is too small, that history should be written in terms of the problems of, and interaction between, 'civilisations' ... Economics is the most individualistic of the social sciences, or at least the branch of orthodox economics called 'microeconomics' is. Keynesian macroeconomics is more holistic and Marxian economics much more. Sociology is holistic but not as much as history is. There is a group of sociologists, however, known as 'exchange theorists', who are as individualistic as any economists. (Gordon 1991, p. 49)

In relation to the different levels of problem analysis, acceptance of the methodological individualism/holism controversy means that social researchers have to operate on a certain level. The main question they need to answer, therefore, is the adequacy of theoretical approach they employ to the problem they need to solve. As Gordon put it:

There are different sets of laws on different levels ... The question as to what level we should be looking at and what laws we should be using can be answered only in terms of the problem that we are attempting to study. Suppose, for example, one wishes to predict the effect of an increase in the price of gasoline on the quantity of gasoline consumed. For this purpose the microeconomic 'law of demand', which is constructed on individualistic foundations, is very useful, but Karl Marx's holistic 'laws of capitalistic development' are not. On the other hand, if one is interested in predicting the long-run future of Western civilisation, the 'law of demand' will provide no help, while Marx's 'laws of capitalistic development' are at least conceivably germane. (Gordon 1991, p. 49)

Social science is also characterised by a division between objectivism and subjectivism, a division between human *action* (subjectivity, meaning) and social *structure* (rules and resources implicated in social reproduction). The objectivism tradition is represented, for example, by functionalism and structuralism which both 'strongly emphasise the pre-eminence of the social whole over its individual parts, i.e. its constituent actors, human subjects' (Giddens 1984, p. 1) and argue that structure 'has primacy over action, and the constraining qualities of structure are strongly accentuated' (Giddens 1984, p. 2). The subjectivism tradition is represented by hermeneutics and interpretative sociologies in which 'action and meaning are accorded primacy in the explication of human conduct; structural concepts are not notably prominent, and there is not much talk of constraint' (Giddens 1984, p. 2).

There are attempts to overcome the dichotomy between the individual and the societal levels of analysis in sociology and to link individual behaviour to the organisational, social, cultural, political and historical conditions. These attempts have been focused on the concepts of *social action* and *agency* and were undertaken within such approaches as symbolic interactionism (Goffman 1969, Mead 1967), ethnomethodology (Garfinkel 1967) and, in particular, in structuration theory (Giddens 1979, 1984).

In symbolic interactionism and ethnomethodology, the term *agency* emphasises the volitional nature of human activity as opposed to the structural conditions that determine and constrain it. Giddens' structuration theory aims to provide a coherent account of human agency and structural demands within the stratification model of the agent in which the reflexive monitoring of activity is a feature of everyday action. The reflexive monitoring means that agents (actors) 'maintain a continuing "theoretical understanding" of the grounds of their activity' (Giddens 1984, p. 5). It may be suggested that this theory can inform the development of a framework connecting three levels of analysis within one model. On the other hand, the structuration theory may be too abstract and a middle range theory may be required. It is suggested that Pierre Bourdieu's (1990) theory of habitus can be used for the development of models linking the societal, group and individual layers of analysis.

This discussion is summarised in Table 5.

Table 5 Terrorism threat anticipation: the contribution of the social sciences required

Social sciences	Heuristic significance	Utility
<i>Social theories and approaches:</i> <i>Symbolic Interactionism</i> <i>Ethnomethodology</i> <i>Structuration Theory</i> <i>Theory of Habitus</i>	Theoretical concepts and frameworks integrating different scales of analysis: <ul style="list-style-type: none"> - societal (system, structure, culture) - group - individual 	Terrorism threat anticipation, which includes: <ul style="list-style-type: none"> - assessment of current situation - obtaining and distributing data - projecting and forecasting of threats

3.4 Terrorist Networks

3.4.1 Michael North on Simulation of Terrorist Networks

Michael North (2005) presented a paper focused on the use of computational tools for an analysis of terrorist networks and presented the NetBreaker terrorist organisation simulation aiming to elucidate possible terrorist networks before they act. The problem is that terrorist networks become visible only after the events. The developers of NetBreaker believe that terrorist networks are not accidental and, therefore, it is possible to model terrorist networks and their activities. The problem in modelling is: can large social network structures be inferred from a small amount of data? So, the NetBreaker model is designed to address the network inference problem. It uses agent-based social modelling to find possible terrorist networks bound by known computable rules of social network formation and available incomplete data. The result is a space of possible terrorist networks. The goal of using this tool is to reduce the surprise by providing and quantifying possibilities, not to determine which possibility is correct.

Michael North (2005) argued that development of useful models of terrorist networks is an interdisciplinary endeavour. It requires the establishment of connections between different 'layers': social layers (personality, identity, greed, leadership, propensity to act and provision

of support) and resource layers (funds, conventional weapons, nuclear, chemical and biological weapons).

3.4.2 Discussion: Activity Theory

Linking the human (social) and the resource layers is needed in order to understand how a possibility can turn into an opportunity and reality when objective causes and subjective intentions are materialised in the form of actions due to the availability of material resources, means and organisation. This task requires the input of different disciplines that study those different objects. However, a theoretical foundation that allows an integration of these layers is yet to be developed.

Activity theory can provide a useful conceptual foundation for this task. Activity theory was first developed in psychology (Leontiev 1978, Vygotsky 1978) and is currently applied in such areas as education, psycholinguistics and studies of information systems (Bødker 1990, Hasan, Verenikina and Gould 2003, Nardi 1997, van der Veer & Valsiner 1994). Activity theory conceptualises activity as a human interaction with the objective reality. Kaptelinin (1997) summarises the principles of the activity theory as following:

- *The unity of consciousness and activity.* Where ‘consciousness’ means the human mind as a whole and ‘activity’ means human interaction with the objective reality;
- *Object-orientedness.* Activity theorists consider social and cultural properties of the environment to be as objective as physical, chemical or biological ones. This environment consists of entities that combine all kind of objective features, including the culturally determined ones, which, in turn, determine the way people act on these entities;
- *The hierarchical structure of activity.* Distinction between activities, actions and operations, as oriented to a motive, a goal or actual conditions respectively. Activities are oriented to motives, that is, the objects that are impelling by themselves. Each motive is an object, material or ideal, that satisfies a need. Actions are oriented to auxiliary motives. Operations are automatised processes. This distinction is used in order to predict human behaviour;
- *Internalisation-externalisation.* These concepts reflect the social nature of mental (cognitive) processes. Mental processes are derived from external actions through the course of internalisation. Internalisation is social by its very nature. Within the zone of proximal development, inter-subjective mental actions become intro-subjective. Mental processes manifest themselves in external actions performed by a person (externalisation), so they can be verified and corrected, if necessary;
- *Mediation.* The key concept of the activity theory as it links the ‘internal’ and the ‘external’, the mental and the material, the acting individual and the means of activity. Human activity is mediated by a number of tools, both external (hammer, scissors) and internal (like concepts or heuristics). The use of these culture-specific tools shapes the way people act and, through the process of internalisation, greatly influences the nature of mental development. Tools are thus the carriers of cultural knowledge and social experience. Tool mediation is no less an important source of socialisation than formal education is;
- *The principle of development.* To understand a phenomenon means to know how it developed into its existing form.

To sum up, activity theory attempts to integrate three perspectives: the objective, the 'ecological' and the sociocultural (Kaptelinin 1997). It emphasises interrelationships between actor's intentions, motives and goals; means (tools, resources); and the broader social context. It looks, therefore, quite promising as a source of conceptual frameworks for the modelling of networks comprising different layers - the human (social) layer and the resources layer.

This discussion is summarised in Table 6.

Table 6 Modelling terrorist networks: the contribution of the social sciences required

Social Sciences	Heuristic significance	Utility
<i>Activity theory</i>	Concept of activity that links: -the actor's intentions, motives and goals -the means (resources, tools) to use -the broader physical and social environment	Integrated analysis of the <i>human (social) layer</i> (personality, identity, leadership, propensity to act, etc.) and the <i>resource layer</i> (funds, weapons, etc.)

3.5 Specific Societies - Specific Models

3.5.1 Edward MacKerrow on Multi-Agent Simulation

In his presentation of the DTRA *Threat Anticipation Project and Multi-Agent Simulation* project, Edward MacKerrow (2005) argued that modelling of social processes in specific societies requires an ability to identify factors, indicators and data that are relevant for understanding and explanation of the modelled processes, e.g. for understanding the spread of grievances in a particular community. MacKerrow claimed that specific models for specific cases need to be developed and that general models applicable to all social processes/phenomena are not possible. Simulation does not produce prediction. Instead, it allows a rigorous and controlled environment to support intelligence analyses. Simulations do not show, for example, that there will be an explosion of violence in a particular year. But they can show that, in certain types of conditions, certain types of behaviour will be seen. So, these models support explanatory and alternative analysis. MacKerrow (2005) has identified two major problems related to the development of context-specific models (see also MacKerrow 2003). One of the problems relates to the identification of relevant factors, indicators and data. The modellers need to answer such questions as: is it useful, for example, to look at socio-economic indicators when Islamist insurgencies are modelled or is the political process approach to theorising Islamist political violence more promising? As MacKerrow said, the socio-economic indicators show very little correlation with Islamist insurgencies and suggest that a causality analysis requires looking at other types of indicators. For instance, the political process approach to theorising Islamist political violence is more promising as it enables the modeller to examine: (1) political and institutional exclusion; and (2) reactive and indiscriminate repression. Identification of relevant factors needs to be informed by cultural insights and, therefore, it may also be useful to use studies produced within the modelled societies.

Apart from making a decision on what indicators need to be taken into account, there is another problem which relates to the nature of social modelling as interdisciplinary research: that of the 'translation' of the social science knowledge to the language of modelling. For example, it may be needed to equip the model with knowledge about people, parties, demographics, ethnographies, population density, mosques, madrasas, churches, etc. In computer models, equations are used, e.g. equations for political participation, political/religious alignment, perceived hardship, missed expectations and social welfare. This means that the social scientific concepts need to be translated into modelling concepts. For example, social norms need to be re-described as rules in agent-based simulation.

3.5.2 Discussion: Social Data and Concepts for Modelling

This discussion focuses on two problems: (1) the problem of the identification of relevant data, factors and indicators for the modelling of specific societies; and (2) the problem of the translation of social scientific knowledge (data, concepts) into modelling concepts.

Identification of Relevant Data, Factors and Indicators

Modelling often needs to be informed by multiple conceptual models and data that can be developed within different social sciences and methodological approaches. This makes it difficult to identify relevant data, factors and indicators. Such an identification can be informed by 'intermediate' conceptual frameworks (models) showing the role of certain factors and indicators in different types of society. For example, Szayna (2000) suggests a framework for an analysis of ethnic conflict as being determined by: (1) types of mobilised groups (the types are defined in terms of strong/weak leadership, good/weak resource support and broad/weak popular support); and (2) types of state (the types of state are defined in terms of strong/weak leadership, strong/weak fiscal position and inclusive/exclusive regime). These typologies enable the researchers to rank states and groups according to their propensity to violence.

The conceptual model suggested in Szayna (2000) is one of many possible and should not be taken for granted. Although it has been formulated within a dominant approach in political science and political economy, it needs to be assessed from the modeller's perspective in order to understand its heuristic significance for modelling and its broader social and cultural implications, as well as affects upon political and security practices. The main task of social scientists working in a modelling team should be the development of or search for such frameworks (conceptual models) and provision of rationale for their use as well as outline of their limitations as heuristic devices. Such frameworks can also help the modeller gather data in a more systematic way as they enable the researcher to clarify information needs (what kind of data the modeller needs) and formulate data selection criteria.

Linking the Social Science Concepts and the Modelling Concepts

The problem of the 'translation' of the social science concepts into modelling concepts requires a more detailed discussion and needs to be informed by the philosophy of science, epistemology and sociological epistemology (which is beyond the scope of this report). It can be suggested, however, that the translation of the social science concepts (middle-range and concrete) into modelling concepts can be made on the basis of the most abstract concepts developed in social theory.

Social science distinguishes between concrete (and middle-range) and abstract concepts. The abstract concepts are those concepts that establish boundaries between most general social theoretical approaches (directions of thought). The following general concepts can be identified: *structure*, *system*, *activity* and *interaction (the system of social activity)*. Each concept establishes a certain theoretical framework for approaching social phenomena:

- *Structure* - The concept of structure enables the researcher to approach social phenomena in terms of elements (nodes), synchronic relations between elements and their hierarchy. This approach draws upon structuralist linguistics (de Saussure 1966) and is represented, for example, by structuralist analysis in anthropology;
- *System* - The concept of system enables the researcher to approach social phenomena in terms of their functions within the whole. This approach is represented, for example, by the functionalist sociology;
- *Activity* - The concept of activity enables the researcher to approach the social from the perspective of individual participants whose activity is shaped by the external conditions and who may also affect those conditions. The concept of activity is used in psychology (cognition theory, activity theory) in order to link the individual and the social;
- *Interaction (the system of social activity)* - The concept of interaction (the system of social activity) enables the researcher to focus on the construction of social reality in interaction. This concept is used in symbolic interactionism, ethnomethodology and critical social theory.

The concrete and the middle-range concepts can be interpreted as being related to one of the abstract concepts. More detailed discussion of these concepts is beyond the scope of this report. It should be noted, however, that the choice of abstract concepts as a theoretical platform for the translation of social scientific knowledge into the modelling cannot be made only on the basis of those concepts' meaning. This choice will depend upon the problems/questions that a model has to solve as well as upon the modelling approaches and techniques used by a particular modelling team. For example, the concepts of system or interaction may not be the best theoretical mediator when the approaches used by modellers enable them to approach phenomena only as states rather than processes. Translation of social scientific concepts into modelling concepts requires the following:

- explaining the meanings of the abstract concepts (structure, system, activity, interaction) in order to avoid communication problems that may appear due to the different understanding of some terms by social scientists and modellers;
- reinterpreting the concrete and the middle-range social concepts in terms of the abstract concepts (structure, system, activity, the system of social activity);
- epistemological reflection upon the modelling approaches and purposes in order to reinterpret those approaches and purposes in the most abstract terms, e.g. state, process, relations, etc.;
- understanding how abstract social concepts can be used as a theoretical ground for the translation of social scientific knowledge into the language of modelling.

This discussion is summarised in Table 7.

Table 7 Modelling specific societies: the contribution of the social sciences required

Social sciences	Heuristic significance	Utility
<i>Anthropology, Sociology, History, Demographics, Economics, Political Science</i> <i>Social Theory, Philosophy of Science, Epistemology</i>	<p>Cultural insights and empirical data to be used for populating models</p> <p>Identification of the factors, indicators and data that are relevant for modelling a social process/change in a specific society</p> <p>Middle-range theories and theoretical frameworks for the translation of social scientific knowledge to the language of modelling</p>	<p>Understanding the potential effects of different counter-terrorism actions or measures upon specific societies</p>

3.6 Cultural Simulation for Threat Assessment

3.6.1 Jore Park on IndaSea Cultural Simulation

The issue of incorporating cultural insights in modelling was the focus of Jore Park's (2005) presentation of the *Cultural Simulation Model for Threat Assessment* (IndaSea). IndaSea is a system that intakes news data; the system's output can be used for threat assessment. The heart of the system is a 'cultural construct' (the filter through which data sources are processed and a perspective from which they are understood). The idea of a cultural construct has been borrowed from a theory of visual art. It refers to two concepts: actor perception and emotional state. These concepts are used in order to explain why a subjective perspective is needed in order to better understand a situation, society, etc. The concepts of objective and subjective views are shaped by perceptive psychology. A subjective view is made from the point of view of one individual (that is unique and can be made from a particular point/distance only). An objective view is a view that everybody would see. For example, a group of people looking at a mountain from a long distance will see the same picture. However, if they come closer to this mountain, each of them will see it differently because it is physically impossible for different individuals to be in the same place. Their vision will also depend on their emotional state. The concept of perception is closely linked to the concept of context. Perception is cultural and contextual. Goals and behaviours are context-specific.

3.6.2 Discussion: Understanding Other Cultures

IndaSea may be useful in order to obtain more meaningful data from news. The ability to process large numbers of texts is accompanied by a better understanding of the meaning of the texts and results in obtaining more reliable data from those texts. Its main advantage is that it enables the user to approach sources (news, etc.) from a particular perspective and to obtain selected and more meaningful data. The cultural construct has been built by the developers of the tool on the basis of information provided by experts, informal conversations with people and so on. In other words, they had to conduct a cultural

(anthropological, sociological, etc.) study of Indonesia aiming at a provision of the conceptual model of the processes taking place in this society. The main problem that the developers encounter is the problem of the selection of relevant cultural knowledge and its systematisation within a particular theoretical framework. This task requires both deep cultural insights (the understanding of the target culture at almost the same level at which this culture is understood by its members) and an analytical deconstruction of the authentic cultural meanings in order to ‘teach’ the software and to ‘understand’ the target culture.

The social scientist contribution to the development of cultural constructs for specific countries/cultures can be twofold. First, the social scientist can provide subject matter expertise in the area of culturally-specific meanings, world views and values. This kind of expertise is needed in order to identify the key cultural concepts and symbols shaping a culture’s members’ interpretation of the reality and, to some extent, governing their activities and actions. Second, the social scientist can draw upon structural and systemic analyses of a particular society (such as Clifford Geertz’ (1976) study of Indonesian society) in order to develop a framework showing how cultural concepts and symbols relate to socioeconomic and political contexts, and in order to understand the relative relevance (weight) of particular concepts and symbols in different contexts. This analysis needs to be informed by sociological studies of cultures and societies such as a comparative study of the development and role of Islamic religion in Morocco and Indonesia (Geertz 1968) and an analysis of religion and ideology as cultural systems (Geertz 1973). It also needs to be informed by semiotic, anthropological and psychological studies of cultural concepts and symbols, e.g. analyses of cultural symbols and cross-cultural communication in Barthes 1970, Leach 1976 and Yu. A. Sorokin 1988.

This discussion is summarised in Table 8.

Table 8 Understanding cultures: the contribution of the social sciences required

Social sciences	Heuristic significance	Utility
<i>Art Theory, Philosophy, Hermeneutics, Literary Criticism, Media and Communication Studies</i>	The concepts of perception, objectivity and subjectivity, text and understanding	Development of culturally-specific information processing tools
<i>Cultural Studies, Anthropology, Ethnography, Sociology</i>	Empirical studies of specific cultures, concepts and symbols; subject matter expertise; cultural insights	Search and analysis of information sources: obtaining more meaningful data from culturally-specific texts
<i>Social Theory, Semiotics, Social Semiotics</i>	Typologies of cultures and typologies of cultural concepts and symbols	

3.7 Summary

This section has outlined a subset of JTAC papers presented by modellers in order to identify issues and problems encountered in the area of modelling of social systems. It has been

discussed how the outlined approaches and models can be assessed in terms of their potential contribution to counter-terrorism practice (utility). Also, this section has discussed the heuristic significance of specific social sciences and theoretical frameworks for modelling.

This section has shown that modellers aiming to support terrorism threat anticipation and minimisation focus on different aspects of terrorism: conditions (structural, systemic) of terrorism emergence and causes of terrorism; terrorist actors (individuals, organisations, networks) and their activity; perception of terrorism; and indicators of the threat of terrorism. The authors of discussed papers tended to believe that terrorism threat anticipation can be better supported by explanatory models rather than predictive models and the development of specific models for specific societies is a more promising strategy than development of generalising models. Development of specific models requires integration of social scientific knowledge.

The discussion conducted in this section has shown that modelling of the different aspects of terrorism needs to be informed by different kinds of social scientific knowledge (theoretical, empirical and methodological) and by different social disciplines ranging from individual psychology to sociological theory.

The following problems have been identified as the most relevant for terrorism modelling: multiple typologies of societies; the need to take qualitative aspects of terrorism into account; the different scales (societal, group, individual) problem; the different layers (social, resource) problem; identification of relevant factors when specific societies are modelled; translation of social knowledge into formal language of modelling; and incorporation of cultural insights into rigorous analysis.

Discussion of these problems resulted in the formulation of research tasks for a modelling team. Also, the discussion has identified key concepts, theories and approaches that can inform development of the intermediate frameworks supporting integration of social scientific knowledge into the modelling.

Table 9 presents a summary of the problems associated with terrorism modelling and the research tasks which a modelling team needs to deal with. It also outlines the social sciences that can contribute to each research task.

Table 9 *Terrorism modelling: problems, research tasks, and the social sciences' contribution. Summary*

Problem	Research task	Social sciences' contribution
Multiple typologies of societies	Develop typologies of societies for modelling purposes	<i>Cultural Anthropology, Ethnography, Sociology, History</i> : Conceptual models and empirical data <i>Social Theory</i> : Typologies of societies <i>Science, Technology and Society Studies, Social Informatics, Sociology of Science</i> : The needs of the modeller and the end user
Qualitative aspects of terrorism perception	Develop typologies of terrorism: quantitative and qualitative dimensions	<i>Psychology, Social Psychology</i> : Empirical studies of public perception of terrorism in different societies <i>Political Science</i> : Typologies of terrorism <i>Social Theory</i> : Middle range theories
The different levels (societal, group, individual) problem	Develop the social interaction framework linking the societal, group and individual levels of analysis	<i>Social Theory (Symbolic Interactionism, Ethnomethodology, Structuration Theory)</i> : Concepts linking social structure and human agency
The different layers (social, resources) problem	Develop the activity-focussed Framework	<i>Activity Theory</i> Concept of activity linking the actor, the means (resources, tools) and the broader social context
Case studies: relevance of specific factors, indicators and data	Develop frameworks and matrices establishing links between social processes in specific societies and particular factors and indicators	<i>Anthropology, Sociology, History, Demographics</i> : Empirical data and cultural insights <i>Social theory</i> : Theories explaining social processes and changes
Translation of social scientific knowledge to modelling	Develop relational frameworks for the translation of social concepts into formal (abstract) concepts	<i>Social Theory</i> : Theories aiming at formalisation of social research
Bringing together cultural insights and scientific analysis	Establish patterns of relations between cultural concepts and symbols and conditions (economic, social, political)	<i>Art Theory, Philosophy, Hermeneutics, Literary Criticism, Media and Communication Studies</i> : The concepts of perception; objectivity and subjectivity; text and understanding <i>Cultural Studies, Anthropology, Ethnography, Sociology</i> : Empirical data and cultural insights <i>Social Theory, Semiotics, Social Semiotics</i> : Typologies of cultures, cultural concepts and symbols

Table 9 summarises problems emerging in the process of social modelling and presents a social science perspective on the research tasks and social theories and approaches. This perspective needs to be further complemented by a set of modelling approaches, which can be a direction of further research.

This section's discussion was aimed at the conceptualisation of terrorism modelling as an interdisciplinary research practice. Specifically, it has been shown that terrorism modelling can be supported by the social sciences in three ways. First, it can provide *knowledge about specific societies*: empirical data, conceptual models, and cultural insights. This kind of knowledge is needed in order to identify relevant variables and relationships, as well as to populate models. Second, social science can provide *theoretical support to social modelling*: key concepts relating to social research, e.g. social system, typologies and categorisations of social phenomena and theoretical explanations of social phenomena at different levels (societal, group, individual). Third, social sciences can provide *methodological support to social modelling*. This includes development of theoretical frameworks to link empirical data to higher-order conceptual models (middle-range theories); theoretical approaches supporting the formalisation of social scientific knowledge; and epistemological and sociological approaches allowing a critical and constructive reflection upon social modelling as interdisciplinary research and a social practice of knowledge production, distribution and consumption.

Table 10 shows which social sciences can contribute to each of those areas and identifies the conditions of the social sciences' integration into the modelling. It suggests that:

- use of empirical data and conceptual models provided by sciences such as sociology, ethnography, psychology and so on needs to be informed by a methodological reflection;
- use of general social theoretical concepts and frameworks in modelling needs to be informed by an understanding of the difference between the objects and methods of social sciences and the objects and methods of natural sciences. This means that modellers should not expect 'the theory' from the social sciences; rather, modellers need to assess the applicability and heuristic significance of different theories for the modelling of a particular phenomenon or process;
- integration of social scientific knowledge into the modelling requires development of methodological approaches and recommendations; this activity needs to be based on studies of interdisciplinary research.

To sum up, integration of the social sciences into modelling and organisation of the social modelling as an interdisciplinary research practice requires epistemological and methodological reflection. Such a reflection needs to inform issues related to the (possibility of) formalisation of social scientific knowledge, social modelling as interdisciplinary research and the effects of models upon practices. This task can be usefully informed by disciplines related to Science, Technology and Society Studies, such as philosophy of technology, social informatics, workplace studies and sociology of science (see Bijker, Pinch and Hughes 1987; Ellul 1964; Kling 1992; Knorr Cetina 1999; Merton 1973).

Table 10 Social sciences: possible contribution to terrorism modelling. Summary

Areas	Social sciences	Integration of social scientific knowledge in modelling
<i>Knowledge about specific societies</i> (conceptual models, cultural insights and empirical data)	<p>Studies of specific societies in Anthropology, Sociology, History, Political Science, Ethnography, Economics, etc.</p> <p>Psychology of individuals and social groups</p> <p>Social studies produced by members of the modelled community ('insiders')</p>	Use of empirical data and cultural insights needs to be informed by social scientific theories and methodological reflection upon their utility and heuristic significance for modelling particular phenomena
<i>Theoretical support to social modelling</i>	<p>Social Theory: typologies of societies as related to the needs that modelling intends to support</p> <p>Social Theory: connecting the societal, the group and the individual levels</p> <p>Activity Theory: establishing connections between social layers and resource layers</p> <p>Middle Range Theories: establishing links between general theories of social systems and empirical (concrete, specific) research</p>	<p>Distinction between the nature of the objects of social sciences and the objects of natural sciences needs to be clearly understood.</p> <p>The role of different social theories as conceptual 'toolkits' applicable to different kinds of problems needs to be assessed</p>
<i>Methodological support to social modelling as an interdisciplinary research practice</i>	<p>Social theories aiming at formalisation of social scientific knowledge</p> <p>Science, Technology and Society Studies, Social Informatics, Epistemology</p>	The methodological significance of social sciences for the organisation of social modelling as an interdisciplinary research practice needs to be explored

4. Social Studies of Terrorism

This section is based upon papers that were presented at the JTAC Workshop by social scientists. It aims to discuss the contribution of social studies of terrorism-related phenomena to modelling. Subsections 4.1 to 4.3 focus on the social sciences as sources of conceptual

models, theoretical approaches and epistemological assumptions. Subsections 4.4 and 4.5 focus on social studies as sources of empirical data and qualitative analyses. The discussion aim is to identify the key issues that need to be considered when social scientific knowledge is being integrated in terrorism modelling. This section also offers some recommendations related to the use of social scientific findings in modelling.

4.1 Modelling Human Behaviour Affected by Terrorism

4.1.1 Yona Rubinstein on Human Response to Terrorism

Different social sciences employ different kinds of research methods: an exploration of some social phenomena requires the use of quantitative research methods and rigorous data processing techniques, while the exploration of other kinds of social phenomena requires the use of qualitative research methods. As Andrew Abbott (2005) has noted in his outline of the state of the art of models in the social sciences, there are lots of models in economics; there are less models in political science (games, simulations); there are not many models in sociology, apart from those developed in Social Network Analysis; and there are very little models in anthropology. Economics is one of the social sciences that use rigorous methods in order to model human behaviour and/or action. One of the popular approaches is a rational choice theory, a formal approach that explains social life as the outcome of rational choices of individual actors and uses technically rigorous models of social behaviour (Jary and Jary 2000, p. 507). At the JTAC workshop, this approach was presented by Yona Rubinstein who argued that a rational choice theory can be used successfully and productively in terrorism modelling. The rational choice theory can be used in order to develop models that would help explain the effects of terrorism on human behaviour. As an example of such usage, Rubinstein presented a study of terrorism as a risk factor influencing consumer behaviour (Becker and Rubinstein 2004).

4.1.2 Discussion: Social Action - Rational Choice Theory

As Rubinstein has shown, the model informed by rational choice theory allows for the study of the effects of terrorism, as manifested through observable and statistically significant actions such as tourist arrivals or the choice of public transport. This kind of model may be quite useful for those interested in the consequences of terrorism. It does not seem to be equally useful for anticipation and minimisation of the threat of terrorism. The latter task requires knowledge about conditions and causes of terrorism, the structure of terrorist organisations/groups, the constituents of terrorist activity and terrorists' motivations. However, the presented model suggests a rather limited conceptualisation of terrorism as a risk factor that can be quantified in terms of high/low risk and high/low probability, but whose specific nature is unknown and unimportant.

Uncritical acceptance of this conceptualisation of terrorism may also have indirect impact on the societal level: it may contribute to the naturalisation of terrorism by eliminating the importance of its moral dimension and, therefore, by encouraging the population to think of terrorism as yet another risk factor characteristic of contemporary life.

Regarding a possibility of extending this approach to the study of terrorists' behaviour, the following needs to be taken into account. The phenomenon that Rubinstein studies is human behaviour conceptualised as a particular type of meaningful social action (instrumental

action) governed by a particular kind of rationality (formal rationality). This type of social action, however, is an abstraction that does not represent even all aspects of economic action.

Sociology studies social action in order 'to arrive at a causal explanation of its course and effects' (Weber 1968, p. 3). According to Weber, 'action is social in so far as, by virtue of the subjective meaning attached to it by the acting individual (or individuals), it takes account of the behaviour of others and is thereby oriented in its course' (p. 3). Weber argued that not every human action is social. For example, action oriented to the behaviour of inanimate objects is not a social action. Actions that do not take into account the behaviour of others are not social even if an action is influenced by other people. It 'is not proposed in the present sense to call action 'social' when it is merely a result of the effect on the individual of the existence of a crowd as such and the action is not oriented to that fact on the level of meaning' (p. 5).

There are different *types of social action*. Max Weber (1968) has identified four ideal types of social action: the most understandable type (rational expediencies; the 'economic man'); the pursuit of absolute ends (these actions may be rational with reference to the means employed, but irrational with respect to the ends pursued); flowing from affectual sentiments (less rational); and traditional (unreflective and habitual), but deemed appropriate.

Social action, like other forms of action, may be classified in the following four types according to its mode of orientation: (1) in terms of rational orientation to a system of discrete individual ends (*zweckrational*), that is, through expectations as to the behaviour of objects in the external situation and of other human individuals, making use of these expectations as 'conditions' or 'means' for the successful attainment of the actor's own rationally chosen ends; (2) in terms of rational orientation to an absolute value (*wertrational*); involving a conscious belief in the absolute value of some ethical, aesthetic, religious, or other form of behaviour, entirely for its own sake and independently of any prospects of external success; (3) in terms of affectual orientation, especially emotional, determined by the specific affects and states of feeling of the actor; (4) traditionally oriented, through the habituation of long practice. (Weber 1968, p. 6)

Different types of social action are governed by different types of rationality (formal and substantial rationality):

The distinction between the *formal rationality* of, say, economic action, as the 'quantitative calculation or accounting which is technically possible and which is actually applied', and *substantive rationality*, which refers to rational social action which occurs 'under some criterion (past, present or potential) of ultimate value' ...

[Weber] regarded the latter as so 'full of ambiguities' as to render any possibility of its systematisation out of the question, since it involves 'an infinite number of possible value scales'. (Jary and Jary 2000, p. 222)

It is important that the types of social action and the types of rationality proposed by Weber are 'ideal'. The 'ideal type' is a key term in Weber's methodological discussion. The ideal type is:

The construction of certain elements of reality into a logically precise conception. The term 'ideal' has nothing to do with evaluations of any sort. For analytical purposes, one

may construct ideal types of prostitution as well as of religious leaders ... By using this term, Weber did not mean to introduce a new conceptual tool. He merely intended to bring to full awareness what social scientists and historians had been doing when they used words like 'the economic man,' 'feudalism,' 'Gothic *versus* Romanesque architecture,' or 'kingship.' He felt that social scientists had the choice of using logically controlled and unambiguous conceptions, which are thus more removed from historical reality, or of using less precise concepts, which are more closely geared to the empirical world. (Gerth and Wright Mills 1948/1970, p. 59)

Weber proposed the concept of ideal social action as a heuristic tool and used the concept of ideal types to abstract economic theory: 'he regarded economics as exemplifying the basic features of ideal type analysis' (Gordon 1991, p. 474):

The kind of ideal-typical model of social action which is constructed, for example, for the purposes of economic theory is ... 'unrealistic' insofar as it normally asks how men would act if they were being ideally rational in pursuit of purely economic goals. It does so in order (i) to be able to understand men's real actions, shaped as they are, at least *in part*, by traditional restraints, emotional impulses, errors and the influence of non-economic purposes and considerations, to the extent that they are also affected by the rational pursuit of economic goals ... but also (ii) to facilitate knowledge of their real motives by making use of this very deviation of the actual course of events from the ideal type. An ideal-typical model of a consistently mystical and other-worldly attitude to life ... would have to proceed in exactly the same way. The more sharply and clearly constructed the ideal types are – in other words the more *unrealistic* they are in this sense – the better they perform their function, which is terminological and classificatory as well as heuristic ... (Weber 1978, p. 24)

The modelling approach informed by rational choice theory is based on the assumption that individuals behave as rational actors and that their behaviour is governed by formal rationality. Therefore, these models can be used for an explanation of instrumental (rational economic) actions. It is not clear, however, if such models can be used in an exploration of terrorism because terrorists' actions can vary from instrumental actions (being governed by formal rationality) to affectual or traditional actions (being governed by substantive, value-oriented rationality).

The example (above) shows that both the modelling methods/techniques and the effects of their use (heuristic significance, utility and social impact) must be assessed. Accordingly, development of the assessment criteria needs to draw upon two research areas: modelling and social sciences. Within the modelling area, criteria for an assessment of formal methods and techniques should be developed. Within social sciences (epistemology, sociology of science), critical analysis of modelling approaches and models is required in order to assess them in terms of their heuristic significance, their possible impact upon work practices of the end user and broader social implications.⁶

Table 11 summarises the discussion of the modelling approach informed by rational choice theory and its contribution to terrorism modelling.

⁶ For an application of a critical reflexive approach to the assessment of technologies and models' impact upon work practices and the society, see Resnyansky (2002, 2006) and Bennett and Resnyansky (2006).

Table 11 Rational choice theory: contribution to terrorism modelling

Object	Behaviour affected by a threat of terrorism
Knowledge/expertise	Rational choice theory
Level and unit of analysis	Abstract individual actor whose behaviour is governed by formal rationality
Conceptualisation of terrorism	A generalised concept of <i>risk factor</i> whose characteristics are quantitative (high/low risk and high/low probability) is used
Heuristic significance	The modelling approaches informed by rational choice theory have a limited heuristic significance for terrorism modelling as this theory cannot help understand the specific nature of terrorism
Utility	Models informed by rational choice theory may be useful for businesses and insurance companies and for agencies that deal with the consequences of terrorist attacks rather than for organisations involved in threat anticipation and reduction
Issue (1)	The use of rigorous methods and approaches developed in the social science (rational choice theory in economics) in terrorism modelling
Recommendation (1)	Criteria of an assessment of the applicability and usefulness of rigorous methods and approaches developed in the social sciences need to be developed. Both the modelling methods/techniques and the effects of their use (heuristic significance, utility and social impact) must be assessed
Research area and activity (1)	<p><i>Modelling</i>: Development of the criteria of assessment of formal methods and techniques</p> <p><i>Social science (Epistemology, Sociology of Science)</i>: Critical analysis of modelling approaches and models in terms of heuristic significance and utility (impact upon work practices of the end user and broader social effects); development of the criteria of their assessment</p>

4.2 Terrorism as an Object of Social Research

4.2.1 Andrew Abbott on the Modelling of Social Systems

From the social sciences perspective, terrorism modelling requires a consideration of broader epistemological and theoretical issues related to the difference between the objects of the social sciences and the objects of the natural sciences. These issues were outlined in a

presentation by Andrew Abbott (2005). One of the differences is that the objects of social science may be events that are particular, rare or statistically insignificant. They are, nevertheless, important because people assign special meanings to them. For example, terrorist acts are not interesting statistically. However, terrorism is an important object of social research because people assign specific meaning to the events that they categorise as terrorism (Abbott 2005). As Andrew Abbott argued, formal models that use empirical/statistical data cannot explain rare events. Therefore, Abbott argued, even those modelling approaches that have been developed in the social sciences are not useful in the exploration and analysis of terrorism. In particular, they are not useful for the research aimed at supporting such an activity as the anticipation of terrorism, as this requires an understanding of how terrorism comes into being. For example, future terrorist activity will come from people who have no other way of political intervention. The main question, therefore, should be how to prevent such a group from coming to exist.

Andrew Abbott then briefly discussed the reasons that make modelling of social systems more difficult than modelling of physical systems (see also Abbott 2001a and 2001b on these issues). He distinguished between *empirical* and *theoretical* reasons.

The empirical reasons are:

- causality: in social processes, social variables (structural and systemic conditions) work, not actors (events are not caused by actors);
- many-to-one problem: starting with different sets of concepts you may come to the same results/conclusions;
- social systems are characterised by interagent communication and ambiguity, and cannot be reduced to formal relationships between agents.

The theoretical reasons are:

- it is not clear what the units of social systems are. Biological individuals are not necessarily such units;
- there are no stable typologies of these units. Categories that apply to social groups are infinite and overlapping; for example, the category of gender overlaps with status. Cultural symbols and objects relating to national identity are infinite;
- social systems have no hierarchy (no hierarchical classification). Symbols come through all 'levels' (which are not levels, directly speaking). They all are able to constrain and shape each other; rules are modified in the process; and the language that describes those rules is modified also.

4.2.2 Discussion: The Objects of Social Research

The characteristics of social systems outlined by Abbott (2005) have important implications for modelling. Firstly, not all social relations can be interpreted in formal terms. Therefore, the modeller needs to clearly identify the limitations of the models focusing on formal relations, in order to complement those models with qualitative research findings and various interpretations related to the non-observable, symbolic aspects of social systems.

Secondly, the modeller needs to be aware that biological individuals may not be the units of analysis when a social system is studied. Also, the modeller needs to be aware that different typologies are possible. Therefore, the modeller who uses different social studies as sources of data or conceptual models should not take for granted the units of analysis identified in

those studies and the suggested typologies as those that are being developed from a particular perspective. The modeller has to problematise the suggested units and typologies and assess them in terms of their relevance to the modeller's own research problems/goals/methods.

It is also useful to be aware of the concepts of a social system and social structure in the social sciences and, especially, about disagreements and debates in regards to these concepts' explanatory (heuristic) status. For example, as Giddens (1984) argued, social systems 'rarely have the sort of internal unity' true of biological systems or of the kind usually assumed by functionalism' (Jary and Jary 2000, p. 580) and social structures 'do not possess the relatively clear-cut "boundaries" in time and space of many physical and most biological structures, nor do they possess the precisely identifiable tendencies to homeostasis possessed by organic structures' (Jary and Jary 2000, p. 578).

Abbott's presentation has highlighted the different nature of the objects of social research in comparison to the objects of natural science. The objects of social research are symbolic and socially (re)constructed. This causes epistemological, methodological and communicative problems when 'rigorous' (mathematical and computational) methods are applied to an analysis of social objects. Therefore, modellers and social scientists need to develop mutual awareness of the differences between the objects of social science and natural science, as well as to understand key concepts and terms used in modelling and in the social sciences (social system, structure, actor). Development of such awareness requires a mutual exploration of the key social theoretical concepts (identity, sociological categories) and an empirical analysis and case studies of specific societies, groups and organisations.

Modellers also need to be aware of the fact that there are no stable typologies of the units of social systems and they cannot be categorised in a hierarchical way. They also need to be able to choose the most relevant typology. Social scientists can assist them by critically analysing the existing typologies and categorisations as shaped by particular research purposes, theoretical approaches and practices. This analysis can draw upon such areas as epistemology (sociological epistemology in particular), sociology of science and discourse theory.

Epistemology

Epistemology is an area of philosophy that 'looks at what knowledge is and at how people come to know things about the world' (Fallis 2006, p. 475). Traditional (Cartesian) epistemology focused on the abstract individual thinking 'ego'. In the emerging sociological approach to epistemology, e.g. sociology of science and sociology of knowledge, the focus shifted from the individual to the society as shaping knowledge and ways of knowing. It is also necessary to take into account the epistemological difference between social and natural sciences and, in particular, the concept and role of theory in social science:

A few remarks are necessary about the 'theory' in social theory. There are certain senses often attributed to 'theory' in the social sciences from which I want to maintain some considerable distance ... This is the view – influenced by certain versions of the logical empiricist philosophy of natural science – that the only form of 'theory' worthy of the name is that expressible as a set of deductively related laws or generalisations. This sort of notion has turned out to be of quite limited application even within the natural

sciences. If it can be sustained at all, it is only in respect of certain areas of natural science. Anyone who would seek to apply it to social science must recognise that (as yet) there is no theory at all; its construction is an aspiration deferred to a remote future, a goal to be striven for rather than an actual part of the current pursuits of the social sciences. (Giddens 1984, p. xviii)

Giddens argues that in social sciences generalisations are not always 'discovered' and that social scientific theories have transformative effects upon its subject matter.

Discourse Theory

The concept of discourse is one of the most powerful and widely-used concepts in contemporary social theory. It is necessary to distinguish the social theoretical concept of discourse from the linguistic (and commonsensical) concept of discourse. In linguistics (and common sense), discourse means a sample of spoken or written language: verbal interchange of ideas, conversation, extended expression of thought on a subject, connected speech or writing, a linguistic unit larger than a sentence ('Discourse' 2006). Discourse as language use has been made an object of the studies of everyday activities, social interaction and social psychology that employ methods of ethnomethodology and conversation analysis (Atkinson and Heritage 1984; Benson and Hughes 1983; Cicourel 1973; Garfinkel 1967, 1986; Schegloff 1987). In these studies, discourse (language use per se) is approached as a realisation of an interaction between the participants of communication.

In social theory, discourse means 'a mode of organising knowledge, ideas, or experience that is rooted in language and its concrete contexts (as history or institutions)' ('Discourse' 2006) and is studied as: (1) a condition and an effect of social structure; and (2) as a social practice. In contemporary social theory, the term *discourse* is used in order to highlight the socio-historical and cultural specificity of systems of knowledge and thought, large-scale ideological formations and rhetorical constructs. In this sense, discourse is more than just a system of ideas: it is a system of ideas intertwined with values, norms and patterns of behaviour (Gee 1996).

Social theorists understand discourse as a worldview or a system of knowledge shaped by certain social and institutional practices; a condition and practice of the social production of subjects, power relations and objects of knowledge; and a practice of the interaction of social groups and an arena of power and ideological struggle. This concept of discourse has informed studies of a number of social institutions, including science. Foucault's (1966, 1972, 1973, 1977) works provide an example of the most systematic use of the concept of discourse as a theoretical tool for investigating different fields of knowledge, such as psychiatry, clinical medicine, grammar and others. Foucault conceptualises them as discourses rather than as ahistorical systems of ideas and objective truths and explores them as having been developed within particular institutional settings and shaped by particular social and professional practices (see, in particular, *The Birth of the Clinic*, Foucault 1973 and *The Order of Things*, Foucault 1966).

To sum up, discourse theory explores fields of knowledge as constitutive of subjects, power relationships and the objects of knowledge. Discourse is constitutive of social subjects and power relationships by offering specific subject positions and by authorising subjects to talk

or depriving them of speaking. Discourse is constitutive of objects of knowledge by highlighting or silencing objects and by prescribing what can and cannot be said about them.

Table 12 summarises the potential contribution of the outlined disciplines and approaches to terrorism modelling.

Table 12 Social theory and epistemology of social research: contribution to terrorism modelling

Object	Conditions and causes of the emergence of groups that may be involved in political violence
Knowledge/expertise	Understanding of the difference between the object of research in social sciences and in natural sciences; Identification of the fundamental theoretical and epistemological issues emerging in social research
Level and unit of analysis	Societal level of analysis (biological individuals are not the obvious units of analysis in social research)
Conceptualisation of terrorism	An effect/result of the processes taking place in a social system; A social group's behaviour in certain systemic conditions
Heuristic significance	Theoretical and methodological support to the conceptualisation of terrorism-related phenomena as objects of social modelling and as objects of interdisciplinary research; Epistemological and methodological ideas related to an exploration of terrorism: meaningful (non-observable) aspects; units of analysis and their typology; Fundamental theoretical concepts: social system, social interaction (exclusion and inclusion), and structural conditions
Utility	This approach may inform development of models that can be used for the purposes of the prevention of terrorism by affecting the causes and conditions contributing to an emergence of terrorism
Issue (2)	Epistemological, methodological and communicative problems when rigorous methods are applied to an analysis of social objects
Recommendation (2)	Increasing modellers and social scientists' awareness of the differences between the objects of social science and natural science; key concepts; and typologies of the units of analysis in social research
Research area and activity (2)	<i>Interdisciplinary communication:</i> Identification of problem areas; <i>Social research:</i> Typologies and categorisations in social research

4.3 Unobservable Aspects of Social Actions

4.3.1 David Sallach on the Modelling of Threat Dynamics

The discussion of the limits of empiricism in social research was continued by David Sallach (2005) who argued that, because social objects have meanings and the most important things about terrorism are not observable, empirical data needs to be supplemented with theory. As an alternative to empirical methods in terrorism research, David Sallach suggested a symbolic interactionism approach to the exploration of violence and terrorism. He argued that symbolic interactionism enables the researcher to approach social actions, e.g. mass violence, as having multiple and simultaneous motives, e.g. fear, status, revenge, conformity, material gain, in-group solidarity and accumulation of power, and to approach motive structures as complex and dynamic (wealth, power, glory, status, love, stability, honour) and, most importantly, to know that there may be motives even if they are not directly observable.

The adoption of the symbolic interactionism perspective allows the researcher to think about terrorism as emerging in the process of social interaction. The interactive nature of terrorism means that the key terms, e.g. adversary, target, asset and vulnerability, are defined in interaction with an implication that the participants of the interaction may assign different meanings to terms. An emergence of threat, therefore, needs to be conceptualised as a relative process: the contribution of both sides (the terrorist and the target of political violence) needs to be taken into account in order to understand the causes of terrorism emergence and to develop effective counter-terrorism measures, particularly on the societal/political/strategic level. The conditions of the emergence of violence may be explained within, for example, a recognition theory (Honneth 1996) that has been outlined by Sallach (2005). Honneth has identified three dimensions of recognition (affinity, solidarity, rights) and considered the classification (categorisation) of constituent groups as acts of recognition or denial, where killing is the extreme act of denial.

4.3.2 Discussion: Symbolic Interactionism

Symbolic interactionism can inform terrorism modelling in several ways. Firstly, symbolic interactionism may inform the development of a critical approach to the use of social knowledge in modelling. Symbolic interactionism studies social phenomena as being constructed by social actors. Therefore, the symbolic interactionism approach can help modellers become aware of this, to understand the necessity of critical reflection upon conceptual systems developed within different disciplines that modellers draw upon and to develop more rigorous epistemological rules and methodological procedures that will guide the modeller's use of knowledge developed within different social disciplines. Secondly, symbolic interactionism encourages the modeller to critically assess the available categorisations, e.g. categorisations of culture, in terms of their relevance for the practice that a given model is intended to support.

Symbolic interactionism may also inform terrorism modelling in terms of the level of analysis and the knowledge content. Within the symbolic interactionism approach, motives and intentions are viewed as being created and changed in social interaction, rather than as static attributes of individual actors. Therefore, symbolic interactionism may provide theoretical foundations for the development of models that would integrate all three levels of

analysis (societal, group and individual) by showing how the 'higher order' concepts are manifested in the interaction of individuals. In terms of the content of knowledge, the interactionist perspective enables the researcher to interpret phenomena of the societal order, such as culture, in relation to the interacting social subjects, rather than in relation to other systems (thus excluding the individual and even the group from the conceptual model) or in relation to an isolated individual. Symbolic interactionism, therefore, allows the development of a typology of cultures that highlights the relation between culture and a *modus operandi*, e.g. violence, on all three levels of social interaction (societal, group and individual).

Having linked societal conditions and a social actor's activity, symbolic interactionism provides a useful theoretical framework for the modelling of the conditions of terrorism emergence. It enables researchers to bring together disciplines as diverse as political science and sociology, or history and social theory. Political science and history offer knowledge about causes of terrorism, but these causes are approached as unique historical events. It is quite difficult to utilise this kind of knowledge in modelling because modelling requires more generalised categories. Sociology and social theory examine systemic and structural conditions in relation to which social groups are positioned (see Szayna (2000) for an example of such an approach). As a result, the conflicts between groups, including conflicts manifested in acts of violence, are presented as shaped (or determined) by forces that are external in relation to social actors. Within symbolic interactionism, the conditions are conceptualised as created by the social actors in interaction. This kind of knowledge is very useful for thinking about terrorism in terms of its prevention as it enables researchers to extend their investigation of the phenomena that may contribute to terrorism emergence. It makes it necessary for the modeller to either use the knowledge about group interaction or, at least, be aware that lack of this knowledge limits a model's explanatory potential.

Symbolic interactionist research, therefore, may usefully inform modelling at the stage of the development of conceptual models of terrorism and the threat of terrorism, and an assessment of their validity. Within symbolic interactionism, social concepts and data are approached as being socially constructed. This approach encourages the modeller to critically assess them as shaped by particular social actors' world views, practices and interests (rather than to take those concepts and data for granted). Symbolic interactionism also enables the researcher to focus on the meanings that social actors themselves assign to their actions and to the factors that influence their actions. Symbolic interactionism provides a theoretical and methodological framework for understanding the social mechanisms and the ways of terrorism coming into being, e.g. through the social construction of a particular actor in relation to others and in assigning particular meanings to their actions.

Sallach (2005) has suggested that an analysis of the conditions of the emergence of terrorism requires an examination of such an important element of the context as culture. Focusing on culture requires the modeller to be aware of problems related to categorisation of cultures.

Cultures are categorised within different disciplines (anthropology, psychology, sociology, communication studies, cultural studies, philosophy) and this can be done in different ways. Cultures can be categorised in terms of fundamental concepts (time, space) and values, the type of society and national character, lifestyle and etiquette, communication patterns and symbols, and so on (see Hofstede 1980).

The choice of the perspective from which cultures are studied and categorised is determined by specific purposes, e.g. studies of cultures have been conducted in order to support such different practices as military operations during World War II, health aid to immigrants in the USA, teaching international students, etc. For example, a well-known categorisation of cultures by Hofstede better serves the needs of the business community.

It is, therefore, important to choose/develop a categorisation that is relevant for a particular research purpose and/or practical problem at hand. David Sallach has argued that terrorism research and modelling require a categorisation of cultures in relation to their attitude towards violence. In relation to violence, cultures can be categorised as cultures of honour, cultures of value and cultures of acquisition, when honour is understood as strength or power. Cultures of honour exist in traditional societies that are characterised by scarce resources and weak state power. Such conditions are also characteristic of areas/societies at frontiers. Cultures of honour can be counterposed to cultures of value and/or cultures of acquisition.

The categorisation of cultures in relation to their attitude towards violence highlights the two social roles of the culture:

- culture as a condition (environment) that regulates people's attitudes and behaviour by providing a set of values and norms;
- culture as a resource of patterns of behaviour (modus operandi).

This categorisation may be particularly useful for the modelling of terrorist activity as regulated by values and norms and as conducted according to certain patterns. Disciplines such as the sociology of science and epistemology can inform reviewing and critical analysis of categorisations as being shaped by research and practical goals. Social theory and Science, Technology and Society Studies can inform development of the criteria for an assessment of different categorisations of cultures in terms of their heuristic significance and utility for terrorism modelling.

Table 13 summarises the potential contribution of symbolic interactionism to terrorism modelling.

Table 13 *Symbolic interactionism: contribution to terrorism modelling*

Object	Social phenomena (reality) constructed in social interaction
Knowledge/expertise	Theory/approach: symbolic interactionism
Level and unit of analysis	The concept of interaction links the societal/group and the individual levels
Conceptualisation of terrorism	Social construct emerging in the process of an interaction of social actors (groups) manifested in everyday, micro-scale actions
Heuristic significance	Can inform modelling by providing theoretical concepts connecting the societal and the group/individual levels of analysis (systemic-structural conditions and social actors' activity)
Utility	Adoption of this perspective may help develop models supporting terrorism anticipation, minimisation or prevention
Issue (3)	The interactive nature of social phenomena. Construction of social reality in human interaction. Relevant categorisation of cultures
Recommendation (3)	Reviewing and analysis of categorisations of culture is needed as related to (and shaped by) theoretical approaches and specific research and non-research interests, goals and practices
Research area and activity (3)	<i>Sociology of Science, Sociological Epistemology, Science, Technology and Society Studies</i> : Reviewing and critical analysis of categorisations of cultures, development of the typologies of cultures as related to the research and non-research goals and practices, and development of the criteria of their assessment (heuristic significance and utility) for the modelling purposes

4.4 Empirical Studies of Terrorism, Global Threat and Violence

4.4.1 Robert Pape on the Chicago Project on Suicide Terrorism

Collection of data on terrorism incidents and actors is one of the most important areas of counter-terrorism practice and terrorism studies (Horgan 2005). The data can be used for different purposes, including demographic/sociological profiling of suicide bombers. An example of such use has been given by Robert Pape (2005a) in his presentation on

The Chicago Project on Suicide Terrorism. The project goal is to create a database that can be used in order to analyse suicide bombing; its causes, conduct and consequences (see also Pape 2003, 2005b). As Pape has claimed, the database contains data that can be used for establishing the demographic, socio-economic and psychological (motives) variables typical for suicide bombing cases.

4.4.2 Discussion: Empirical Data Analysis and Interpretation

The presented database is, potentially, a valuable source of empirical data that can be used in modelling. However, the modeller who would like to use Pape's database needs to be aware of two kinds of problems: (1) problems related to data gathering and selection (use of multiple sources, selection criteria and definitional ambiguity); and (2) problems related to data analysis and interpretation (the possibility of a generalisation over the entire data set;), the possibility of establishing regularities and patterns, and the usefulness of the resulting models for an explanation of suicide bombing.

The main objective of the *Chicago Project on Suicide Terrorism* was to collect demographic data on suicide attackers with the use of native language sources (Arabic, Hebrew, Tamil, Russian and others). Various sources were used, including terrorist group documents (LTTE, Hezbollah, Hamas, Al Qaeda), target country lists (IDF, MFA, State Dpt), media (FBIS, Lexis, international and local), and international research (Beirut, Cairo). The list of sources looks quite impressive. However, a modeller establishing correlations between variables may not find a dataset drawing on diverse sources particularly useful. Different researchers and agencies providing raw data for those sources may use different methods and may interpret cases differently, which may result in establishing false correlations between variables.

Definitional ambiguity was highlighted as one of the biggest problems of Pape's database. The database was criticised for being quite selective and, as a result, providing incomplete data, since it only included 'successful' cases of suicide bombing. It was asked if the database should include cases of unsuccessful attacks and factors that turn people away, and if terrorist acts against military targets should be counted. Definitional ambiguity is a well-known problem within social studies of terrorism and social researchers are aware of how it may affect their research. As Horgan (2005) put it:

An example of the practical ramifications of the definitional ambiguity of the word terrorism is illustrated by examining the number of reported terrorist incidents by different observers using varying definitions. Friedland illustrates the 'wide discrepancies' between estimations of terrorist incidents by noting that the Rand Corporation estimated that 1,022 international terrorist attacks occurred in the ten-year period 1968-1977, while the US Central Intelligence Agency's estimate for the same period was 2,690. Similar discrepancies and confusion arise when comparing different statistical indices of the frequency of terrorist violence around the globe. Different criteria exist not only for what classifies as terrorism per se, but also in terms of what kind of acts should be included in such resources. The Rand St-Andrew Terrorism Chronology database, for example, mainly includes events of 'international' terrorism, defined as 'incidents in which terrorists go abroad to strike their targets, select victims or targets that have connections with a foreign state (such as diplomats, foreign businessmen, and offices of foreign corporations) or create international incidents by attacking airline passengers, personnel, and equipment. The database therefore excludes, as its creators

themselves admit: violence carried out by terrorists within their own country against their own nationals, and terrorism perpetrated by governments against their own citizens. For example, Irish terrorists blowing up their Irishmen in Belfast would not be counted, nor would Italian terrorists kidnapping Italian officials in Italy'. And as the Al Qaeda attacks in the United States illustrated, it can only take one or two large-scale incidents to skew figures substantially and mislead about the apparent extent and direction of terrorism. This issue aside, terrorist events themselves are not the only end result of a series of potentially complex activities (some of which in themselves constitute terrorist events and, therefore, offences), as we shall see in later chapters, but this taken with the inclusion in databases of successful terrorist events, presents us with datasets the significance of which is easy to overestimate or misread completely. (Horgan 2005, pp. 4-5)

Although the definitional ambiguity problem is well known to social researchers, in particular those conducting primary empirical research, its significance and effects may be neglected in the secondary research, e.g. modelling, that drew upon primary research data. Therefore, the user of databases similar to Pape's database needs to be aware of the limitations that such databases have due to the definitional ambiguity. It is recommended that a framework should be developed that would enable the modeller to assess the relevance of data (variables) for particular modelling purposes. Also, criteria for an assessment of data validity and limitations of specific datasets need to be developed.⁷

Pape has been criticised for making generalisations over the entire dataset (collected by Pape from different sources). For example, Salim Yaqub (2005) has questioned the epistemological foundations of Pape's approach and criticised his conclusions for not taking into account broader historical context, such as development of Arab nationalism.⁸ Pape's approach is based on the assumption that there are some general causes of suicide terrorism. Salim Yaqub reminded the participants that this is a rather problematic assumption and referred to historical studies showing that the causes of terrorism and suicide bombers' motives are socioculturally specific. Therefore, Salim Yaqub argued, a model of suicide bombing should not try to explain all suicide bombing cases; instead, models should focus on specific regions. Pape (2005a, 2005b) argues that demographic and sociological data do show a pattern in terms of suicide bombers' economic background, religion, and sociological and psychological attributes, although this pattern differs from the image constructed in public consciousness (as this image has been reconstructed by Pape). According to this study, the suicide bomber is an employed, well-educated and secular (not a poor, uneducated, religious zealot). Let us discuss some of these variables in more detail.

One of the most interesting conclusions, from Pape's point of view, is the fact that attackers are more secular than we should expect. Pape argues that this conclusion appears due to the fact that the Tamil Tigers is the biggest and very active organisation that undertakes terrorist actions. According to Pape, it is not clear, however, if this organisation should be included into the same pool as other terrorist organisations because their targets differ from the targets of other terrorist organisations (it is a leftist organisation and it is a well-known fact that leftist terrorist groups act against officials and military targets).

⁷ See also Kramer (2003) for critical comments on Pape's database.

⁸ See Yaqub (2003) for a historical study of Arab nationalism.

Pape can be criticised for an uncritical acceptance of a categorisation of Tamil Tigers as a leftist organisation. Meanwhile, there are studies suggesting that the secular strands in the Liberation Tigers of Tamil Eelam (LTTE) are overemphasised and that the 'secular face' imposed on the LTTE reflects only the official ideology of the LTTE movement (Roberts 2005). A cultural anthropological study of the embodied practices of Tamil followers, however, allows suggesting that the LTTE followers' dispositions are informed by a belief in *śakti* (divine energy) that attracts and unites Hindus, Christians and Buddhists. As Roberts argues, the secular face of LTTE represented in its official ideology can be challenged, for example:

Through an exposition of the hero rites for the fallen among the Tamil Tigers ... The rites of Hero Week reveal practices that echo Saivite forms. The LTTE's investment in this event involves passive co-ordination. The climatic moment is a simultaneous act of widespread commemorative grieving. The rite is also an undertaking that mobilises, remembers, legitimises, transcends, inspires, and renews. (Roberts 2005, p. 67)

This example shows that empirical data needs to be approached critically. In particular, modellers who intend to use empirical data need to question the categorisations that the database creators use, as such categorisations may result from the creators' incomplete awareness of the state of the art in a particular field, their reliance on the current *doxa* (opinion, commonsensical discourse) largely formed by media rather than scientific research, or from the current state of the art in a particular field.

Another example relates to the area of methodology. As Pape has argued, his database allows identification of such characteristic attributes of a suicide bomber as education (the majority of attackers were educated people). However, as some sociologists and economists have noted, it is necessary to consider the demand-supply issue when the data are interpreted. Yona Rubinstein criticised Pape's model for not taking into account the fact that the supply of educated people is more than the supply of the uneducated in some countries. It is hardly possible nowadays to find somebody without education in those regions where terrorist groups are active. Also, education is one of the conditions of becoming a terrorist (a member of a proactive movement).

An analysis of the examples above shows that it is necessary to approach demographic and sociological categories as relational: for instance, what is considered to be an 'educated' person in certain societies and/or for certain purposes may be considered as lack of education in other societies and for other purposes. For example, a comparison of data regarding the participation of males/females or people with no education/higher education in terrorist organisations requires an understanding of the meaning of such variables as gender⁹ or higher education in a particular society. Otherwise, false conclusions regarding

⁹ Unlike in common usage, the sociological category of *gender* does not mean the distinction between anatomical *sexes*. In sociological usage, gender means a social rather than biological division; the terms *masculine* and *feminine* 'are reserved for culturally-imposed behavioural and temperamental traits deemed socially appropriate to the sexes. These traits are learnt via a complex and continuing process of socialisation ... Gender is seen as culturally and historically relative, i.e. the meaning, interpretation and expression of gender varies both within and between cultures, and is subject to historical modification. Social factors such as class, age, race and ethnicity also shape the specific meaning, expression and experience of gender, underlining the fact that gender cannot be equated in any simplistic way with sex or sexuality ... In some cultures, the biological differences between sexes may be exaggerated and in others minimised. Thus, the biological differences between the sexes cannot be regarded as having inherent or universal meaning.' (Jary and Jary 2000, pp. 240-241)

the role of different factors in people's engagement in terrorism can be made. For instance, in Testas (2004) study, numerical (formal) data suggested that the role of such a factor as higher education in the increase of political violence is quite significant. However, as Testas argues, it is not the availability of higher education to more people in the Middle Eastern countries that is important. Rather, it is the content of that education that is important and the fact that the majority of students are studying religious subjects rather than natural sciences or professions.

In other words, education may not be a variable that is relevant for understanding who may become a terrorist. Similarly, the relevance of even such an 'objective' variable as income per capita can be questioned. It was suggested that it is necessary to look at human capital rather than at general income per capita. There are numerous studies in which the relational nature and significance of such 'objective' variables for the understanding of group and individual involvement in political violence are explored and discussed. The majority of authors come to the conclusion that neither of those variables has absolute causal role; it is necessary to consider them in relation to other factors, such as the type of political regime, etc. (see Lacquer 2003; Szayna 2000).

This conclusion can be supported by a more general epistemological and methodological argument on the nature of variables and categories as socially constructed. In general terms, this argument is conducted within such areas as, for example, cognitive anthropology. Within sociology and critical demography, the heuristic and social significance of traditional sociological and demographic categories has been problematised (see Szreter, Sholkamy and Dharmalingham 2004). The traditional demographic categories have been developed within another kind of practice, e.g. administrative surveys, and for other purposes, e.g. fiscal, and their usefulness for the needs of contemporary defence and security agencies is not that evident. Also, they have been developed within the western sociology and may not reflect the sociocultural specificity of other types of societies (as the Tamil Tigers example has shown).

A related problem is the problem of statistical information as a source of data for a researcher. For example, Young (2005) discusses statistical information as a tool of modern warfare and highlights the problem of the US statistical unpreparedness in the new times. This unpreparedness - in the light of those new needs, traditional statistical information looks incomplete and inadequate - results from the fact that statistics focuses only on a few points. The choice of those points is determined by the interests of particular groups and agencies, e.g. the census of population is taken primarily to afford a basis for congressional appointment, with the implication that statistical information is not of adequate usefulness for other needs:

Our national problem, in its essence, is that of redirecting our efforts and output into new channels, of focusing all of our national energies on the one supreme task before us ... The successful execution of such a program calls for a degree of national self-knowledge far beyond anything that we might have imagined necessary or possible in the past ... In this emergency we turned first to existing stocks of statistical information and to the current statistical output of our government bureaus, and have realised, perhaps for the first time, how woefully incomplete and inadequate our federal statistics are. ... Under these conditions a war statistical service had to be improvised. With no centralising and coordinating agency at work, the boards and commissions created to take charge of the

various fields of war work have had to procure for themselves, as best they could, the statistical information needed for their purposes. (Young 2005, p. 58)

This problem is also known as the problem of official statistics (surveys, census); its completeness and adequacy:

The way in which statistics are collected, e.g. as a by-product of the work of administrative agencies, sometimes by a large number of untrained recorders, can lead to major inconsistencies, unreliability, and uncertainties about the meaning and worth of data. ... Finally, statistics are always collected for some purpose, which will usually be different from that of the sociological researcher; above all, they are the result of a process of categorisation and the attachment of numbers which involves inherent difficulties of the kind identified particularly by ethnomethodologists ... A classic example of the issues that can arise is the debate concerning Durkheim's use of suicide statistics. (Jary and Jary 2000, p. 428)

This brief outline of the categorisation and measurement problems has shown that the user of databases like the one created by Pape needs to be aware of these problems, and that the development of rigorous and working models requires a critical reflection upon the categorisation of data in various sources. Modellers need to be able to approach demographic and sociological variables from the relational perspective. This means that the data chosen for comparison need to be first examined and interpreted in relation to the societies/contexts in which it has been obtained. The comparison of data from different societies needs to be conducted in relation to the meanings that particular variables may have in particular societies.

Such a comparison can be supported by conceptual frameworks that enable the modeller to relate data and variables to the types of societies examined, in order to understand the meaning of empirical (observable) data and to make sure that the same kinds of data are compared and/or generalised upon. There are social studies that critically analyse positivist approach to the categories of social science, e.g. critical discourse analysis in sociology, critical demography, etc., and show the sociocultural nature of those categories. It is not, however, enough to just examine those studies and make a compilation of the research findings that are made in them because they do not examine those variables from the perspective of terrorism research and, in particular, from the perspective of terrorism modelling. Therefore, development of such conceptual frameworks needs to be made a specific research task for the social scientists informing the work of a modelling team.

4.4.3 Marvin Zonis on Failed Countries as Global Threat

Difficulties with selection and interpretation of data (what data are relevant and what data are not relevant for an assessment of threat) have also been highlighted in studies of macrosociological factors and threat indications. These factors and indicators have been discussed, for example, by Marvin Zonis (2005) in his overview of factors contributing to global threats beyond terrorism. These are such factors and indicators as: GDP and per capita income; rate of economic growth; the type of state income, e.g. rental, emerging markets, population growth, birth rate, life expectancy, oil demand and supply, and the level of democracy. Also, such a factor as cultural integration/isolation is important.

Marvin Zonis gave examples of how empirical data can be used in order to obtain information on the indicators listed above. For example, the growth of car ownership per 1,000 persons is an important factor in global threat assessment. Currently, car ownership per 1,000 persons in the US is 486 and in China is 32. There will be increase in car ownership in China, which means that their demand for fuel (petrol) will also increase. This will have serious international implications, particularly taking into account the dynamics of oil demand/offer (world oil demand grows; natural field decline rate is 5.4%).

Apart from traditional socioeconomic indicators, Marvin Zonis gave examples of other kinds of indicators relevant to the problem of global threat. For example, an important indicator of cultural integration/isolation is the number of book titles translated into a particular language. There are 300 million Arabs in the world and 11 million Greeks. However, fewer books were translated to Arabic than to Greek per year. Hence, Arabs are less included in world culture. Marvin Zonis argued that failed countries (20% of the world population) are the major source of threats for the U.S. Every country whose economy depends on the export of resources (oil, etc.) is a failed state because it lives on rental income. Saudi Arabia is the ultimate example of a failed state (no work ethics, cannot develop democracy, no market). Population is growing fastest in failed states, in Arab countries in particular. The USA will become more dependent upon the Middle East (hostile regimes with hostile population). Marvin Zonis suggested that the problem of failed states can be solved by wider participation in nation building through economics.

4.4.4 Discussion: Use of Macroeconomic Data

Macroeconomic studies, an example of which was presented by Marvin Zonis, can be used as sources of knowledge about macroeconomic factors that may contribute to the emergence and proliferation of terrorism. This presentation has also shown that even such 'objective' data as GDP, economic growth rate and others depend upon theoretical and methodological approaches used by researchers and sources of official statistics. Therefore, such data cannot be taken for granted; instead, they need to be interpreted by a subject matter expert. This means that access to data is not the only thing that the modeller needs. In order to use those data properly, the modellers need to be able to assess the data as being grounded within and shaped by particular theories and methods. A more detailed overview of the methodological issues related to the use of empirical data is provided below.

4.4.5 Robert Townsend on Poverty, Inequality and Violence

The socio-economic conditions that may result in an emergence of the threat of violence in a particular community or region has been the focus of Robert Townsend's (2005) presentation entitled *Threat Anticipation: Poverty, Inequality, and Terrorism*. The study resulted in comprehensive empirical data that are available from the *Thailand Database Research Archive* (2005). The archive of key economic, social and demographic indicators is based 'on six years of survey in north-eastern and central Thailand and two years of field research in Muslim-majority provinces in the south, as well as a cross-sectional survey of 250 households in provinces bordering on Malaysia' (Townsend 2005). The *Thailand Database Research Archive* (2005) archive contains datasets on:

- environment: major land use, road class and elevation, forest type, etc.;
- income, consumption, wealth (household assets: television, cars);

- demographics: population density, poverty incidence rate, the level of education and literacy rate, unemployment rate, mortality rate, malnutrition;
- financial intermediation: use of banks; availability of savings funds; percentage of households with debt; formal vs. informal;
- migration;
- number of deaths due to murder; violent crimes; drug crimes;
- other.

These data have been obtained through primary social research, which means that the researcher worked not with data supplied by other researchers but with data supplied by the subjects of study during surveys, interviews or observations. The data available from the archive are linked in several ways and the hypothesis that links them is made explicit. This archive, therefore, can be considered a good example of a research database.

An analysis of the Thailand Project data has been conducted in order to explore the structural (formal) conditions of the formation of a group of candidates for terrorist activities. It highlights the distribution pattern as an important socio-economic factor contributing to the emergence of violence and terrorism. Distribution patterns are more important than the absolute level of income. In poorest regions, inequality results in the formation of a pool of talented proactive people whose destiny is to remain marginal. This group of talented yet deprived people is a potential candidate pool for violence-oriented movements. This category and this generalisation can be used for modelling the emergence of terrorism in different countries and regions.

Unlike such categories as income per capita, education, gender and so on, the 'talented yet deprived' is a relational category. An advantage of using relational categories is that they can be used in order to understand the emergence of groups that may be involved in terrorism in different societies. In the modelling of the conditions of terrorism emergence, instead of an assessment of structural conditions per se (inequality), it is necessary to understand which strata (what kind of people) are affected by inequality and whether the society offers mechanisms for changing this situation in a peaceful way (to understand whether the existent structural conditions are slowing down social dynamics in such a way that it is very difficult or impossible for talented people to enter the higher strata).

4.4.6 Discussion: Use of Microeconomic and Sociological Data

This discussion focuses on two issues: (1) the use of primary vs. secondary data and the use of open sources of information (specifically, media) in modelling; and (2) the difference between terrorism as an object of modelling and terrorism as an object of social research.

Primary and Secondary Data. Open Information Sources

Apart from the content of data available in the Archive, it is necessary to emphasise that this kind of research has a particular value for modelling due to the fact that it is primary research. It is important that modellers are able to use primary research data rather than media reports/stories and/or analytical/theoretical speculations as their sources of data. Media stories do not present 'pure facts' – they present opinions. Therefore, they can be used as sources of data about the 'speaker/presenter' (their intentions, goals, assumptions and world views as shaping those opinions), but not as sources of data about the reported

(or, rather, constructed) reality. So-called analytical papers and theoretical speculations present selected data obtained from secondary research. They usually do not explicate the authors' assumptions nor discuss the methods with which those data were obtained because their major goal is not to undertake a scientific (objective) inquiry, but to promote a version of reality that serves specific political purposes, to defend a particular group/agency viewpoint and interests, or to justify somebody's actions. Similarly to the media, such papers can be made objects of research and analysis within those disciplines that explore the speakers' intentions and interests manifested through the versions of reality that they construct and promote using various channels, including analytical papers and theoretical speculations (see Reid (1993) for a study conducted within sociology of science). However, the analytical/theoretical speculations are not particularly useful for those who try to explore the reality with rigorous methods and/or those who develop tools to support such an exploration.

The advantage of the primary empirical research conducted within a particular disciplinary area is that it offers raw data, from which the modeller can select the required data due to the use of a particular conceptual model of the modelled phenomena, and in regards to the limitations of the modelling approach and technique. In contrast to media and analytical/theoretical speculations, academic research is the one that is explicit in regard to its theoretical assumptions, disciplinary area, and methods and data sources. This enables an assessment of data in terms of its validity, reliability and comprehensiveness. In academic research, results/conclusions are inferred from available data and the process of inferring is explicit. The conclusions are presented as hypotheses that are more probable than others, rather than as an ultimate truth. All these can guarantee a certain methodological rigorousness allowing the modeller to hope that the data and the conclusions are not significantly shaped by taken for granted (or hidden) assumptions, biases and interests.

As with any real knowledge, one needs to be able to take/use primary research data. It is recommended, therefore, that the modeller needs the social scientist's help. A social scientist can help solve possible problems with the use of quantitative data. For example, as Townsend noted, regional data on per capita GPP may be misleading because it does not show all the money that is in a region because, for instance, adult children may send money to their parents from other regions.

Terrorism as an Object of Modelling and an Object of Social Research

Townsend's study highlights a more general epistemological issue that terrorism modellers need to reflect upon. This is the issue of the conceptualisation of terrorism as an object of research in modelling. It is necessary to realise that terrorism, as an object of modeller's research, differs from terrorism as an object of social scientist's research. For example, in Townsend's project, the level of disaggregation was assessed. Disaggregation, as Townsend argues, causes an emergence of a group that may be involved in political violence. Therefore, the level of disaggregation in a society is an important indicator that can be and should be used in models of terrorism. However, the knowledge of the level of disaggregation in a particular society does not automatically lead to the ability to model terrorism. The latter task requires knowledge of how this factor relates to other factors. Townsend's study has been conducted within a well-established disciplinary field (sociology, economics) and one of its goals was to find empirical data related to the variables that, as it has been agreed

within that disciplinary area, are relevant to an explanation of such a phenomenon as disaggregation.

Terrorism modelling is not such a mature disciplinary area yet, which means that it may still need to prove that disaggregation is a relevant factor for the emergence of terrorism. Actually, there are findings, e.g. historical studies, which suggest that disaggregation may not be that important as the history of terrorism gives examples of people being involved in terrorist activity without being positioned as disaggregated (at least, seemingly). Also, there are findings suggesting that it may be not the level of disaggregation per se but the fact that the disaggregation takes place in a particular type of society (see, for example, Lacquer (2003) on the level of democracy that matters). The Townsend study has shown that it is the conditions which lead towards some groups' disaggregation that need to be assessed. The concept of disaggregation seems particularly useful for modelling because it is a relational category that can be used in order to conduct comparative analysis of the emergence of mass violence in different societies.

Table 14 summarises the key issues and recommendations related to the use of empirical data in social modelling.

Table 14 Use of empirical data: issues and recommendations

Issue (4)	Empirical data gathering and selection: a multiplicity of sources, subjectivity and definitional ambiguity
Issue (5)	Empirical data analysis and interpretation: generalisation, patterns and variables
Recommendation (4)	Development of a framework enabling the modeller to assess the relevance of data (variables) for particular modelling purposes; development of criteria for an assessment of data validity and limitations of specific datasets
Recommendation (5)	Construction of matrices relating data and variables to the types of societies examined, in order to understand the meaning of empirical (observable) data and to make sure that the same kinds of data are compared and/or generalised

4.5 Formation of Threatening Identities

4.5.1 Emmanuel Saadia on a Pan-European Muslim Community

This subsection discusses how terrorism modelling can be informed by qualitative social research such as an historical study of the causes and the possibility of the formation of a so-called Pan-European Muslim community presented by Emmanuel Saadia (2005).

The possibility of unity of Muslims in Europe (transnational Muslim community) is an important strategic issue, which is in debate among Muslim intellectuals. According to the available data, in 1999, there were 15 million Muslims in Europe: 4.5 million live in France,

3.3 million in Germany, 1.5 million in the UK, and 0.75 million in Netherlands (see Table 15). There are also Muslims in Belgium, Austria, Spain and former Yugoslavia. In some countries, it is the second-largest religious denomination. In spite of the fact that immigration is largely stopped, this denomination is growing because birth rates are high. Saadia identified those proactive groups that are interested in the 'European Muslim' project, argued that the notion of European Muslims is problematic and outlined the key problems and advances in the process of the Muslim communities' integration into the broader European society.

Emmanuel Saadia has argued that different indicators and factors need to be considered when the Muslim communities and the broader societies are examined in order to understand whether the integration of Muslims into European societies is possible. For the Muslim communities, the following indicators and factors need to be examined: the sociology of immigrants, immigrants' self-identification and the presence of radical elements. For the wider societies/countries, the following indicators and factors need to be examined: colonial past (yes/no) and the naturalisation policy. Emmanuel Saadia argued that the formation of a Pan-European Muslim community is not very possible due to the differences among Muslim communities that live in particular European countries and the differences between the countries. The following are brief outlines of Saadia's analysis.

Table 15 Percentage of Muslims in European countries (France, Germany, UK and Netherlands)

Country	Total population 1999 est. (Millions)	Number of Muslims	% of that country's total population that are Muslims
France	58.5	4.5	8%
Germany	82	3.3	4%
UK	58.5	1.5	3%
Netherlands	16	0.75	5%

Germany

Most Muslims living in Germany are Turks – 76% of Muslims living in Germany are Turks (2.5 million Turks out of 3.3 million total Muslims in Germany). Turkish migrants have not been integrated into German society. The first generation was not naturalised, the Turkish community was not enfranchised, they still live by themselves, are self-organised and they do not interact with the rest of the society. Germany did not have a colonial past. Turkey and Germany were allies in war, which has contributed to an emergence of cultural understanding. Therefore, as Saadia suggests, the slow integration of Turkish immigrants into broader German society can be explained by the sociology of the immigrants. The first generation of Turkish immigrants were invited workers coming from rural areas of Turkey during '60 and '70s. This means that they had experienced a double trauma: having to move

to another country and having to move from villages to cities, which affected their ability to be integrated in the highly-industrialised and urbanised German society. The factor of disintegration may imply that there is a possibility that the Turkish community could become a constituent of the (hypothetically emerging) Pan-European Muslim community. However, another factor - *self-identification* - needs also be considered. It is important that Turks do not tend to self-identify in terms of religion. Although there are radical Islamists among Turks, the majority of the Turkish community practice traditional Islam and self-identify themselves as Turks, not Muslims. In addition, being a Turk seems to be shaped by the socio-political concept of group identity (nation), rather than by the tribal concept of group identity (ethnicity)¹⁰: Turks are divided among themselves around political parties, e.g. there are Kemalists. A different case is presented by the 800,000 Arabs living in Germany (1% of Germany's total population; 24% of Muslims living in Germany). They differ from the Turkish community, from the first generation of Turkish immigrants in particular, in terms of their sociology: many of them are students and refugees. Also, they tend to identify themselves as Muslims and radical imams are very active among Arabs. Therefore, the idea of Pan-European Muslim community may be more popular among the immigrants from Arab countries than among the Turkish community living in Germany.

France

The French model is different from the German. Firstly, France has a colonial past. Among 4.5 million Muslims living in France, 4.3 million (96%) are from North Africa with 2.8 million (62%) from Algeria (these include the first, second and third generations). They started to migrate after WWI and the majority of workers came after 1945. Immigrant workers from Algeria in the 1960s were the main work force, but not very skilled. When heavy industry decreased, they were out of job. Then immigration stopped. Since 1975, their families started to come and those born in France became French. Secondly, the Muslim community in France is very poor. As some people argue, poverty, unequal access to education and unequal opportunities add to the proliferation of radical Islam. However, the majority self-identify themselves as French, rather than Muslim. Only a small minority self-identifies as Muslims. Self-identification as Muslims is recent and comes from dissatisfaction. In spite of the problems that the Muslim community has/creates in France, it is possible to find bright spots, which are Muslims' growing integration in the political process and naturalisation (half of Muslims are French and they can vote).

Apart from the sociology of immigrants, another interesting and important factor is the relationship between different brands of Islam, e.g. Arab Muslim and salafists, as well as the role of such influential groups as, for example, the *Muslim Brotherhood*. The Muslim Brotherhood in Europe is an orthodox and self-organising group which has become a constituency in Europe and has influence. The *Muslim Brotherhood* believes that Muslim communities of Europe should be part of *Umma* and want to create European Muslims. However, they are against violence and for integration in the political process. Saadia suggested that it is also useful to consider those factors that relate to the international situation. For example, the possibility of the formation of a Pan-European Muslim community may be affected by such a big issue as the relationships between Europe and

¹⁰ See Castells (1997) on the importance of the concept of identity in contemporary world and on different types of identities. Castells argues that the rise of tribal identity (as a counter-reaction to the global society, democratisation and secularisation) is one of the causes (or consequences) of the turbulence and instability in contemporary world.

Turkey. A rejection of Turkey because they are Muslims may result in the Turkish community self-identifying themselves as Muslims (because the larger community identifies being Turk with being Muslim).

4.5.2 Discussion: Qualitative Social Research

It may be difficult to formalise the qualitative and interpretative research similar to the one presented by Saadia. Nevertheless, such studies need to be part of the modeller's R&D because they problematise categories and facts that have been naturalised in doxa (public opinion) and that modellers tend to take for granted. For example, Saadia's study suggests that it is not religion (Islam) per se that affects the possibility of Muslims' unity or integration in broader society. Rather, this possibility can be affected by historical and cultural differences among Muslim communities on the one hand and among the Muslim communities and those broader societies in which they live on the other hand. Historical studies such as the one presented by Saadia¹¹ are useful in the following ways:

- it is a study conducted by a scholar who may be considered a member of the examined 'community'; as such, this study can provide useful cultural insights and a new interpretations of events;
- this study has identified methodological problems with obtaining empirical data relevant to an analysis of such a process as the construction of an identity. For example, it is difficult to obtain empirical (statistical) data relevant for this issue because many countries in Europe do not report religious or ethnic denominations, e.g. it is forbidden in France;
- this study can be used as a source of data as it has identified factors that affect the level of integration of particular communities in different European countries.

Most importantly, this study presents an example of a relational approach to an analysis of historical conditions, which has a big heuristic significance for the modelling of social objects. Firstly, this approach allows a consideration of the role of particular attributes of a migrant community in relation to the attributes of the broader community. Secondly, this approach links 'objective' attributes of a group, e.g. the percentage of educated members, etc., and the qualitative case study of the meanings that this group constructs, e.g. self-identification. This approach encourages asking such questions as: what does it mean to be an educated second-generation Muslim of Arabic descendant in a particular country? This approach has a big heuristic significance for modelling because it links the historically specific and typological: on the one hand, it shows that 'standard' sets of sociological attributes typical for a group have different meanings in different societies; on the other hand, it suggests a typology of those societies that is relevant for an analysis of the problem at hand.

Qualitative studies can help modellers understand the conditions that contribute to increasing/reducing terrorism and mass violence threat and explain terrorism and related phenomena. For example, the outlined study may help understand whether Islam is to be blamed or is it the large city as a specific sociocultural formation? The identified conditions, factors and indicators can usefully inform the assessment of the possibility of increasing the threat of terrorism from within Australia and in the region.

¹¹ See also Kabir 1998, Kepel 2004, Lacquer 2003, Razi 2001.

4.6 Summary

Section 4 discussed the following issues related to the social sciences' contribution to the modelling of terrorism and the threat of terrorism:

- *Social sciences' contribution to an assessment of the models' utility* - The social sciences can help develop criteria for the evaluation of models (and tools) in terms of their ability to contribute to such tasks as terrorism threat anticipation, prevention or minimisation of threat, dealing with the consequences of terrorism and so on. For an assessment of the utility of models/knowledge of terrorism, it is necessary to identify what aspect of terrorism and/or social phenomenon related to terrorism is the focus of a particular social discipline/approach that informed the development of those models;
- *Social sciences as a source of modelling approaches* - The social sciences can offer rigorous methods that may be used for the modelling of such aspects of terrorism as its effects as manifested by the public's behaviour (the public's reaction to the perceived probability of terrorist threat);
- *Theoretical and epistemological contribution: unobservable aspects of terrorism* - The social sciences highlight the fact that objects of social research differ from the objects of natural sciences in the following ways: people assign meanings to them, they are constructed in social interaction and they have a symbolic nature. Therefore, those models that ignore these aspects (are characterised by empiricism) may fail to capture the essence of the modelled phenomena;
- *Social sciences as a source of categorisations* - The social sciences can offer conceptual models of terrorism-related phenomena and the categorisations of those phenomena. However, the social sciences also explain that a social phenomenon can be categorised in several ways and that all categorisations are socioculturally specific and are shaped by different groups' interests and goals. Therefore, the development of conceptual models of terrorism needs to be accompanied by an epistemological reflection in order to assess the relevance of different available categorisations;
- *Social sciences as a source of theoretical insights and interpretations of terrorism* - The social studies can focus on different phenomena related to terrorism and on its different aspects (actor, activity, effects). Qualitative social research can provide useful insights and multifaceted knowledge on various issues. These range from historical causes and structural conditions that contribute to an emergence of groups that may be involved in terrorist activities to motivations that may drive individual terrorists, and to the perception of terrorism by victims. Although not all this knowledge might be formalised, it can still be used in modelling as it helps approaching rigorous models within a holistic picture;
- *Theoretical and methodological significance of critical/constructivist paradigm in social research* - The specific knowledge offered by the social sciences cannot be used directly in modelling. In order to use social research in modelling, intermediate theoretical/conceptual frameworks need to be developed. Social theory and the epistemology of social research are those disciplines that need to be drawn upon in order to develop such frameworks.

To sum up, the social sciences can contribute to modelling in the following ways: (1) they can inform the epistemological aspects of modelling and explain the difference between the objects of natural and social sciences; (2) they can offer conceptual/theoretical frameworks and categorisation systems that enable modellers to approach terrorism and other social

phenomena from different perspectives; (3) they can provide data, insights and case studies; and (4) they can facilitate interdisciplinary communication.

5. Conclusion

5.1 Research Directions, Issues and Activities

The JTAC workshop (*Threat Anticipation: Social Science Methods and Models 2005*) has shown that there is a growing understanding among the modelling community involved in terrorism threat anticipation and reduction that social modelling needs a contribution from the social sciences. The analysis conducted in this report can inform social modelling by giving a better understanding of the issues related to the social sciences' integration in terrorism modelling. It can inform the research work of social scientists contributing to terrorism modelling, the evaluation of models of terrorism and the threat of terrorism and the identification of the key issues in social research that need to be addressed in order to provide social scientific support to terrorism modelling.

The analysis conducted in this report enables us to define terrorism modelling as a specific research area with its own object of research and to understand how a social scientist can contribute to terrorism modelling. This analysis highlights the fact that terrorism modelling and social studies of terrorism are two distinctive research areas that draw upon different conceptualisations of terrorism. The conceptual gap between modelling and the social sciences makes the social sciences' integration in terrorism modelling a difficult task that needs to be made a specific research issue. The social sciences, such as epistemology of social research and social theory, can inform the conceptualisation of terrorism as an object of modelling.

Conceptualisation of terrorism as an object of modelling is one research activity to which social scientists can contribute. Another important and necessary part of their work is the provision of subject matter expertise in different areas of social research: political science, history, economics, sociology, cultural studies and so on. In order to integrate this knowledge in modelling, intermediate frameworks are required. Such frameworks could govern the choice and use of social scientific findings according to the demands of the modelling tools developer and the needs of the end user. Therefore, an important research task for social scientists is the development of intermediate conceptual frameworks allowing an integration of empirical and qualitative research in terrorism modelling.

This report can also inform development of an approach to the evaluation of models. Due to the multiplicity of modelling approaches and techniques as well as the diversity of social knowledge, different intermediate conceptual frameworks are possible: structure-focused, system-focused, activity-focused and interaction-focused. Choice of frameworks, modelling tools and techniques, and social scientific data/knowledge can be governed by a consideration of the needs and practices of the models' end user.

It has been argued in this report that terrorism models and the social concepts they draw upon need to be evaluated from two perspectives: the perspective of the researcher (heuristic significance) and the perspective of the user (utility). In order to understand a model's

heuristic significance and limitations, it is recommended to critically analyse the key concepts and theories in which the model is grounded and to reveal their sociocultural and disciplinary specificity. In order to assess whether/how the use of the model can contribute to different tasks and goals related to counter-terrorism and terrorism threat anticipation and/or reduction, it is necessary to identify the aspects of terrorism that a model can/cannot describe.

This report has identified several issues that need to be addressed in order to integrate the social sciences in terrorism modelling:

- *Linking empirical data from different sources: relational frameworks* - Due to the interpretative nature of sociological data and sociocultural nature of variables (education, gender, etc.), there is a need for a development of relational categorisation scheme that would enable modellers and analysts to assign weight to data taken from different contexts;
- *Linking social scientific concepts: relational concepts* - Social scientific concepts have a qualitative nature. In order to be formalised, these concepts need to be related to each other. It is necessary, therefore, to explore heuristic capability of social theories that link different conceptual levels in relational terms;
- *Linking social scientific knowledge and modelling: intermediate theoretical frameworks* - There is a problem with establishing links between qualitative research and modelling. Qualitative researchers do not produce such conceptual models that could then be formalised. It is not their problem. Therefore, there is a need for intermediate concepts and frameworks linking general social theories and empirical data on the one hand and social theories and modelling concepts on the other hand.

Table 16 summarises our suggestions regarding the research directions, issues and activities that need to be addressed in order to support terrorism modelling.

Table 16 Social scientific support of terrorism modelling: research directions, issues and activities.
Summary

Direction	Issue	Activity
Terrorism modelling as a research practice	Conceptualisation of terrorism as an object of modelling Interdisciplinary communication	Development of theoretical frameworks connecting social scientific knowledge and modelling approaches DSTO's 'Social Science for Modellers' Reading Group
Social theoretical support of modelling	Typologies and categorisations Theoretical concepts: social system, identity, social distance, activity, agency Relational concepts	Development of the criteria of selection of conceptual models and development of the rules and procedures for the use of social scientific knowledge in modelling
Quantitative and qualitative social research: empirical data, patterns, regularities and case studies	<i>Terrorism emergence</i> : causes, motivations, socialisation <i>Terrorists</i> : sociological and psychological profiling <i>Terrorist organisations</i> : structure <i>Terrorist activity</i> : actor, conditions, object, goal, means/methods	Identifying the subject matter areas that are relevant for a particular modelling task Development of frameworks and recommendations for the use of empirical data and qualitative research findings
Cultural insights	The other's (insider's) perspective	Coordination of studies conducted by subject matter experts
Tools supporting counter-terrorism analysis and decision making	Agent-based Simulation Social Network Analysis	Exploration of the needs of the intended user conducted by the modellers and the social scientists Development of conceptual models and design of the tools

5.2 Report Outcomes

The report has the following outcomes:

- the key theoretical and epistemological issues have been identified that are relevant to the task of modelling terrorism and the threat of terrorism, as envisioned by modellers and social scientists;
- the social sciences' approaches to terrorism and the threat of terrorism as objects of modelling have been outlined and their relevance/impact upon the task of threat reduction has been discussed;
- the social sciences that provide empirical and qualitative studies of factors relevant to an assessment and prevention of terrorism have been mapped; their advantages and limitations have been outlined;
- some gaps/problems in existing approaches to the conceptualisation of terrorism as an object of modelling have been identified; it has been suggested that one of the major gaps/problems is generated by the multileveled (societal, organisational and individual) nature of the phenomenon of terrorism;
- future research tasks have been formulated according to the suggested understanding of terrorism as an object of modelling and analysis.

This report has shown that the following major issues need to be addressed in order to support terrorism modelling.

Firstly, it is necessary to develop theoretical frameworks that allow an integration of social scientific knowledge into modelling. In the social sciences, issues related to violence, social changes and terrorism are approached from different perspectives: historical, social theoretical, sociological, political, economic and cultural. Therefore, the social sciences offer multiple concepts of terrorism and the threat of terrorism and offers diverse and multifaceted empirical data. In order to integrate this knowledge in modelling, researchers need to be able to assess the theoretical and epistemological significance of different conceptual models. They also need to be aware of the advantages and limitations of empirical social research, as well as of the problems related to the use of empirical data. Due to the outlined complexities, the conceptualisation of terrorism as an object of modelling needs to be made a specific research issue whose consideration needs to be informed by a broader concept of interdisciplinary research (see Shchedrovitsky 1995a, 1995b) as well as an understanding of the objectives and practices supported by modelling/simulation tools.

Secondly, it is necessary to develop frameworks that allow an integration of the different aspects of terrorism, such as the conditions (social, economical, political, cultural and religious) of terrorism emergence; the identity and the structure of interested and mobilised groups; the terrorists and potential recruits' motivations, goals and means. The development of such a multilayered framework can draw upon such theories as symbolic interactionism, structuration theory and activity theory.

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